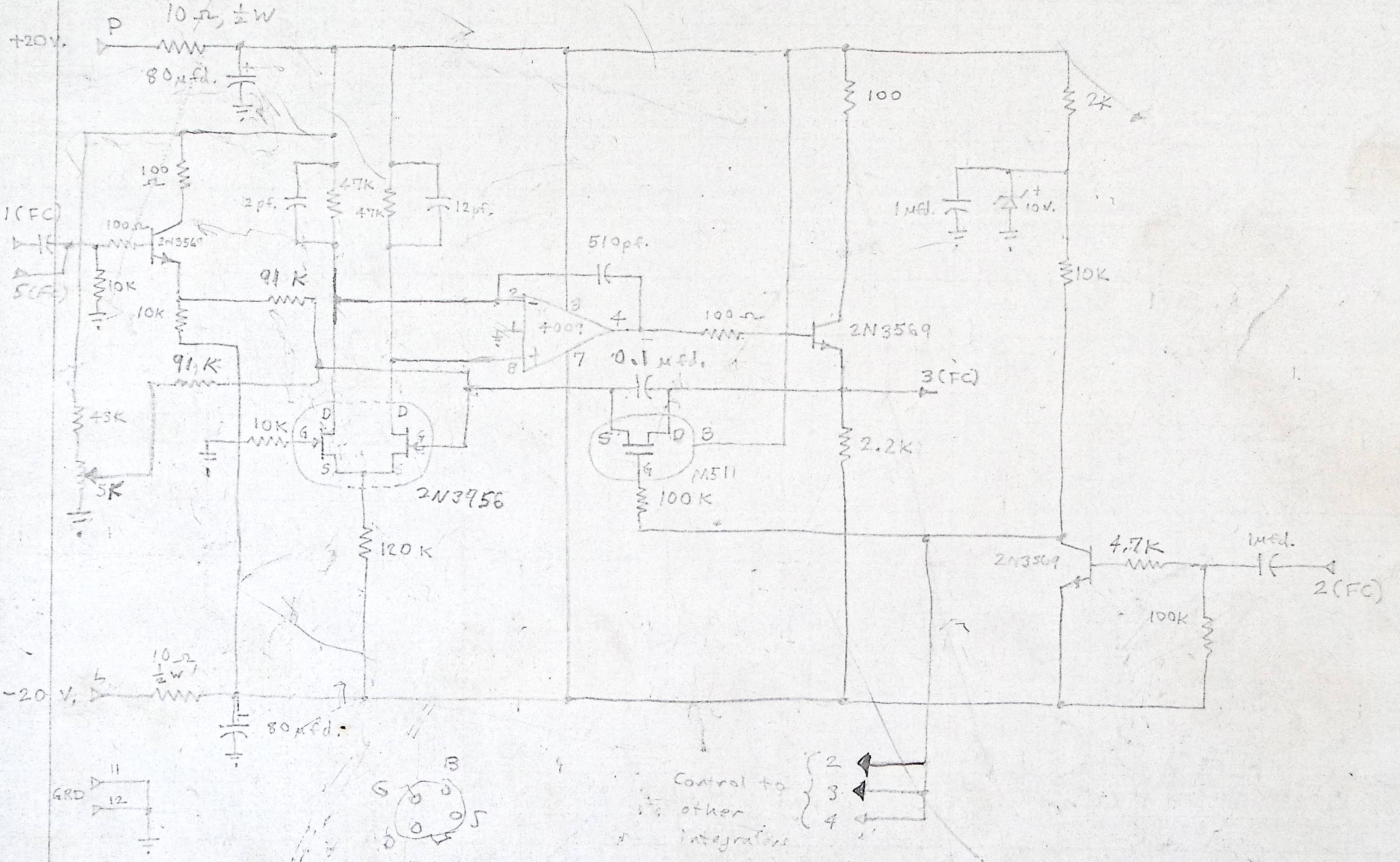
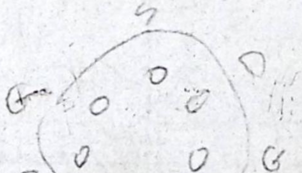
XP100	INTEGRATOR CARD 2ea	ONR
XP101	" "	
XP102	"C" CKT CARD 2ea	GENERAL
XP103	" " "	
XP104	" " "	
XP105	COMMUTATOR CONTROL - ONR	
XP106	RAMP GENERATOR — USED IN GENERAL COMPUTER	
XP107	MANUAL INPUT INTEGRATOR - GEN.	
XP108	SQUARING CKT. GEN	
XP109	MOUTH GATED OSC.	
XP110	SUMMING AMPLIFIER X 10	
XP111	GATED OSC.	
XP112	RAMP GENERATOR WITH BLANKING	
XP113	QUADRATURE GENERATOR (FOLD-OUT SCHEMATIC JA-20)	
XP114	COORDINATE ROTATION SUMMING AMPLIFIER	
XP115	" " " "	
XP116	" " " "	
XP117	ANALOG MULTIPLIER (INTRONICS) 2ea	
XP118	CIRCLE BONE GEN	
XP119	CIRCLE BONE BLANKER	
XP120	TV CAMERA / COMPUTER INTERFACE & SYNC	
XP121	ZELTEX AMP CARD	
XP 122	LOG AMP (NON-LINEAR AMPLIFIER) [FOR LIPS]	
XP 123	FILM FLAGGER - A	
XP 124	FILM FLAGGER - B	
XP 125	INTENSITY OUTPUT AMPLIFIER	
XP 126	PEAK DETECTOR	
XP 127	PEAK DETECTOR CONTROL LOGIC	
XP 128	MOUTH SPECTRUM ANALYZER	
XP 129	CLOSURE CKT.	
XP 130	SIN.COS GENERATOR	
XP 131	J1 SIN-COS ROTATION	
XP 132	J2 " " "	
XP 133	J3 " " "	
XP 134	J4 " " "	

PC-10 DIFFERENT X INTEGRATOR

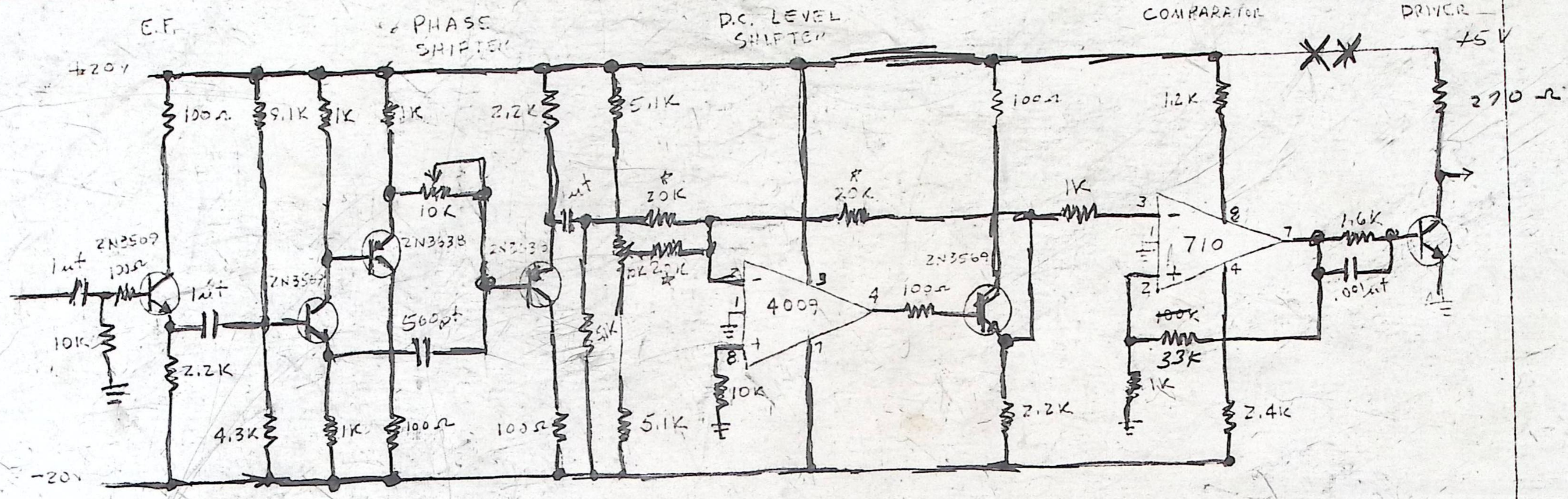




Integrater Card.

XP 101
XP 100

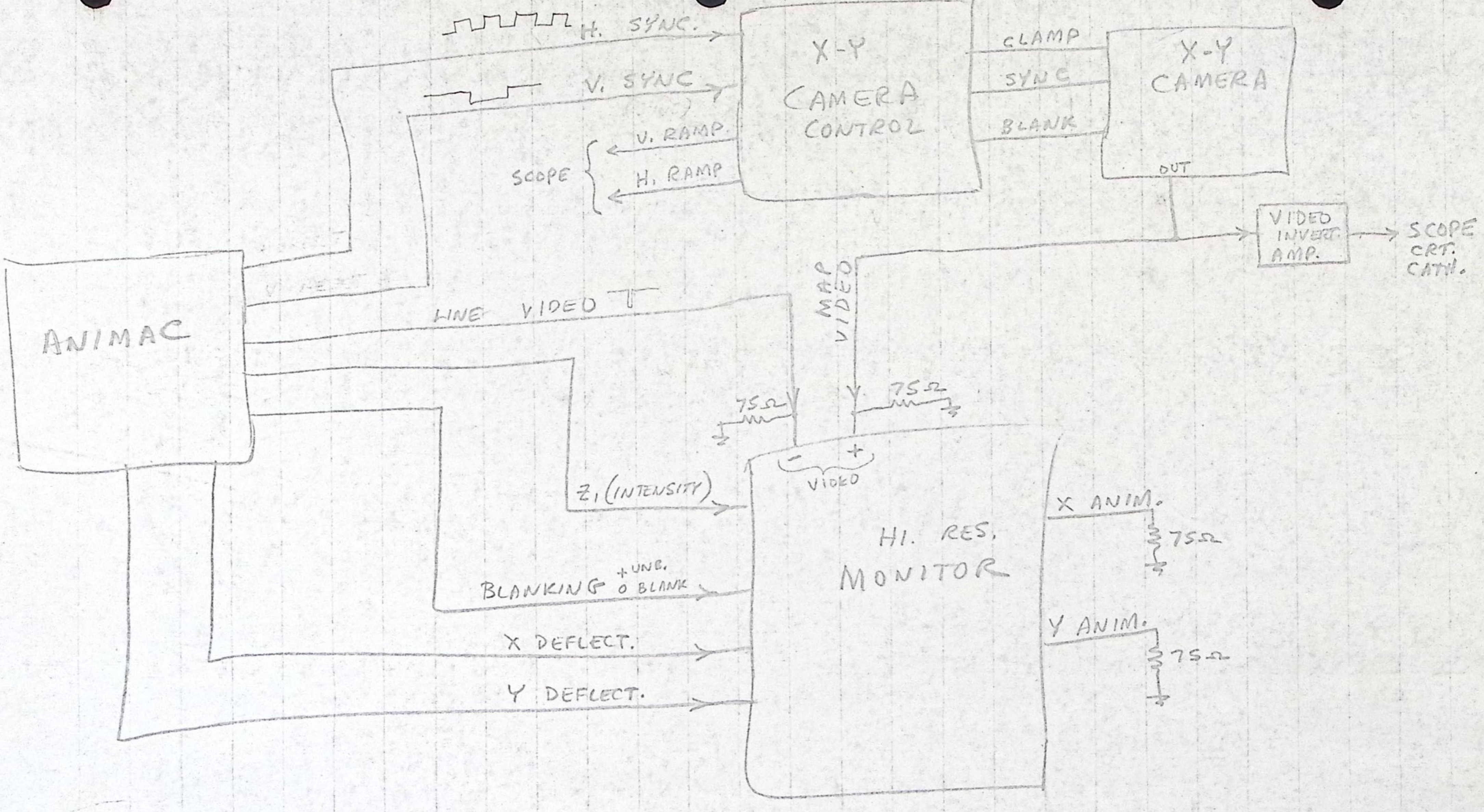
XP 102
XP 103
XP 104



"C" CKT

XP102 HAS ONE "C" CKT ON IT.
XP103 } HAS TWO ON ONE CARD
XP104 }

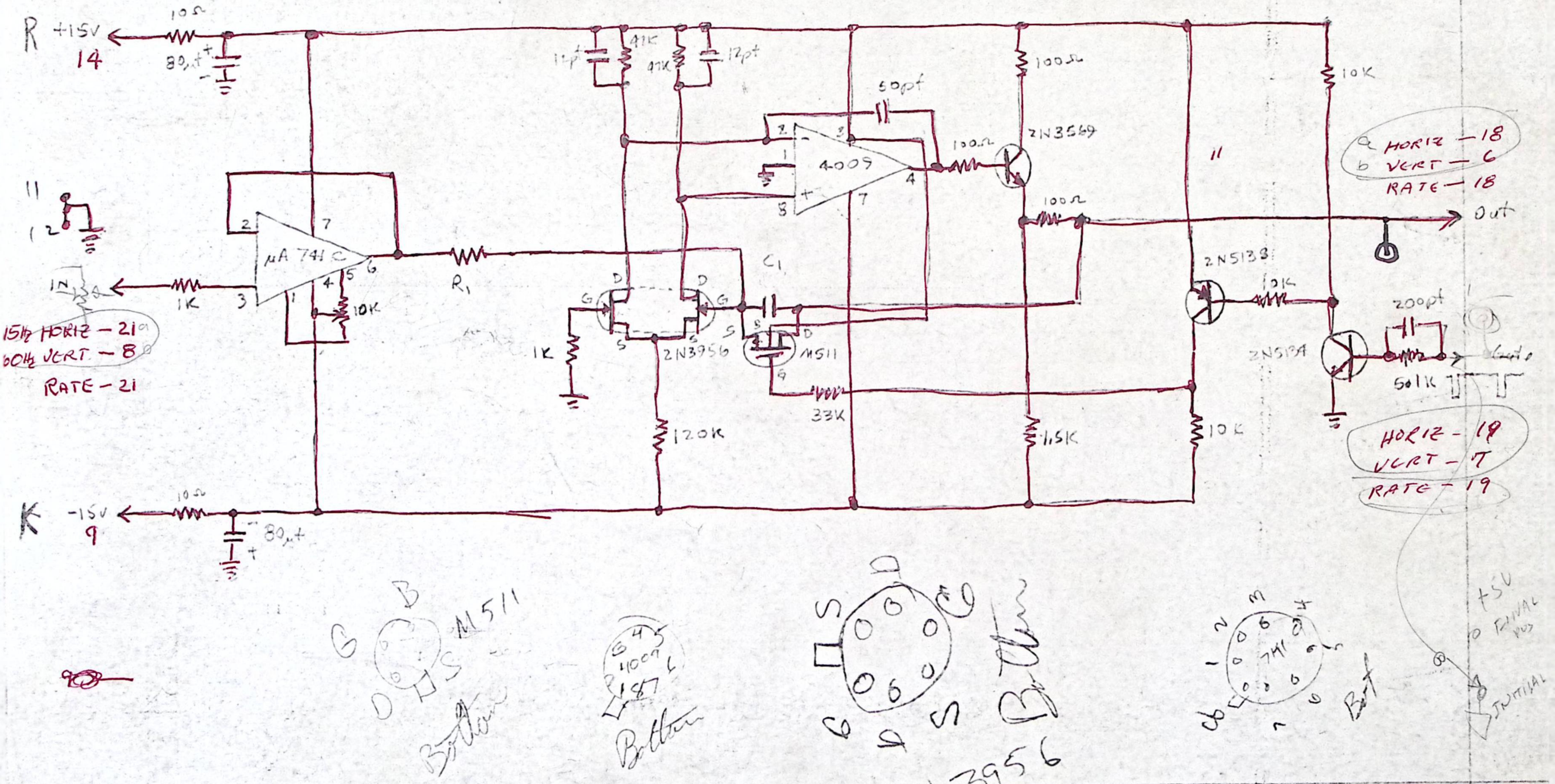
XP102
XP103
XP104



ANIMAC — WORLD GLOBE OPERATION

WCA 10-10-69

	f	R_1	C_1
HORZ	15KHZ	5.1K	.01µf
	60Hz	180K	.1µf
		180K	1µf

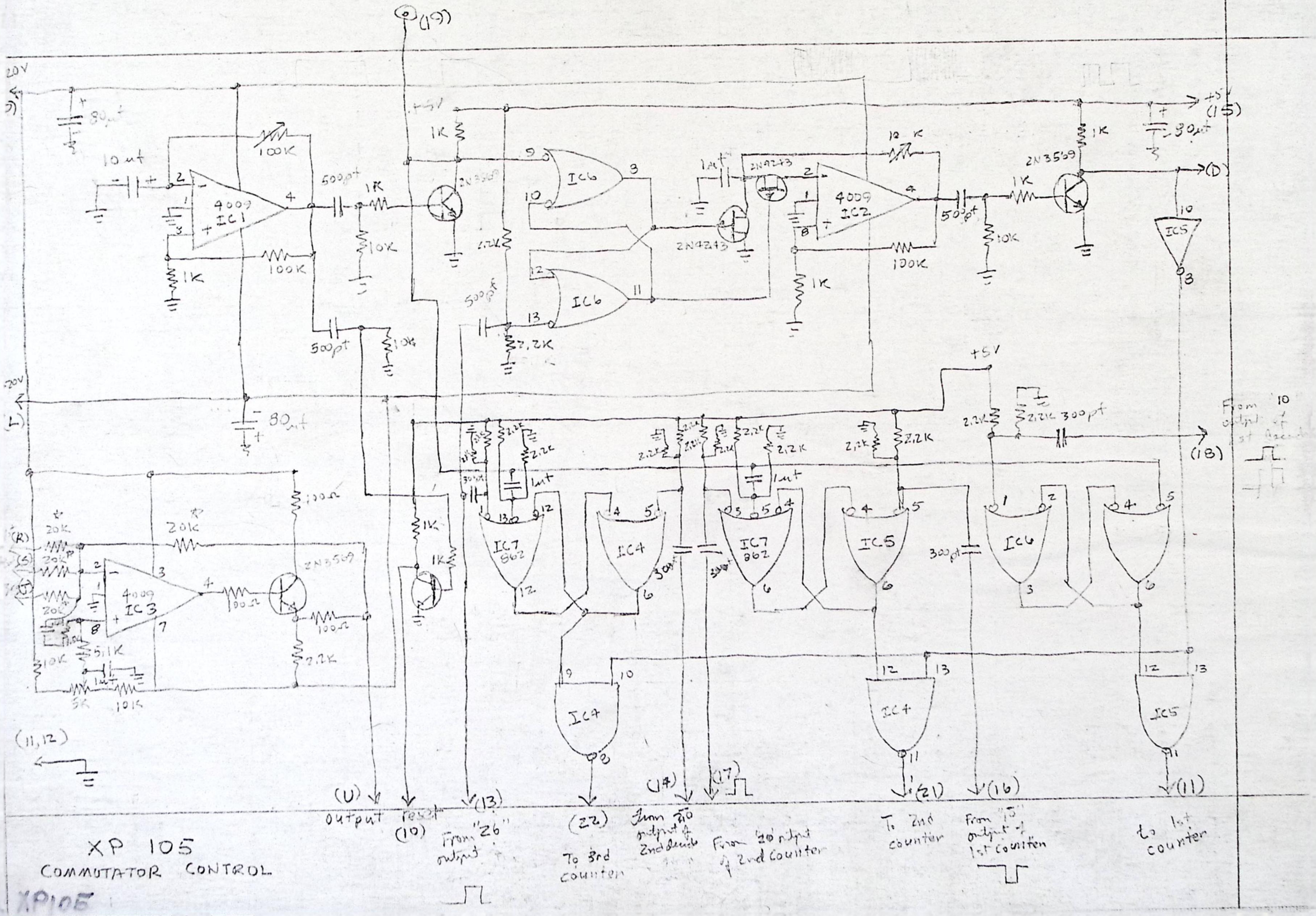


HORIZ.-VERT INTEGRATOR

XSM104

P-8
~~P-15~~

XP 105

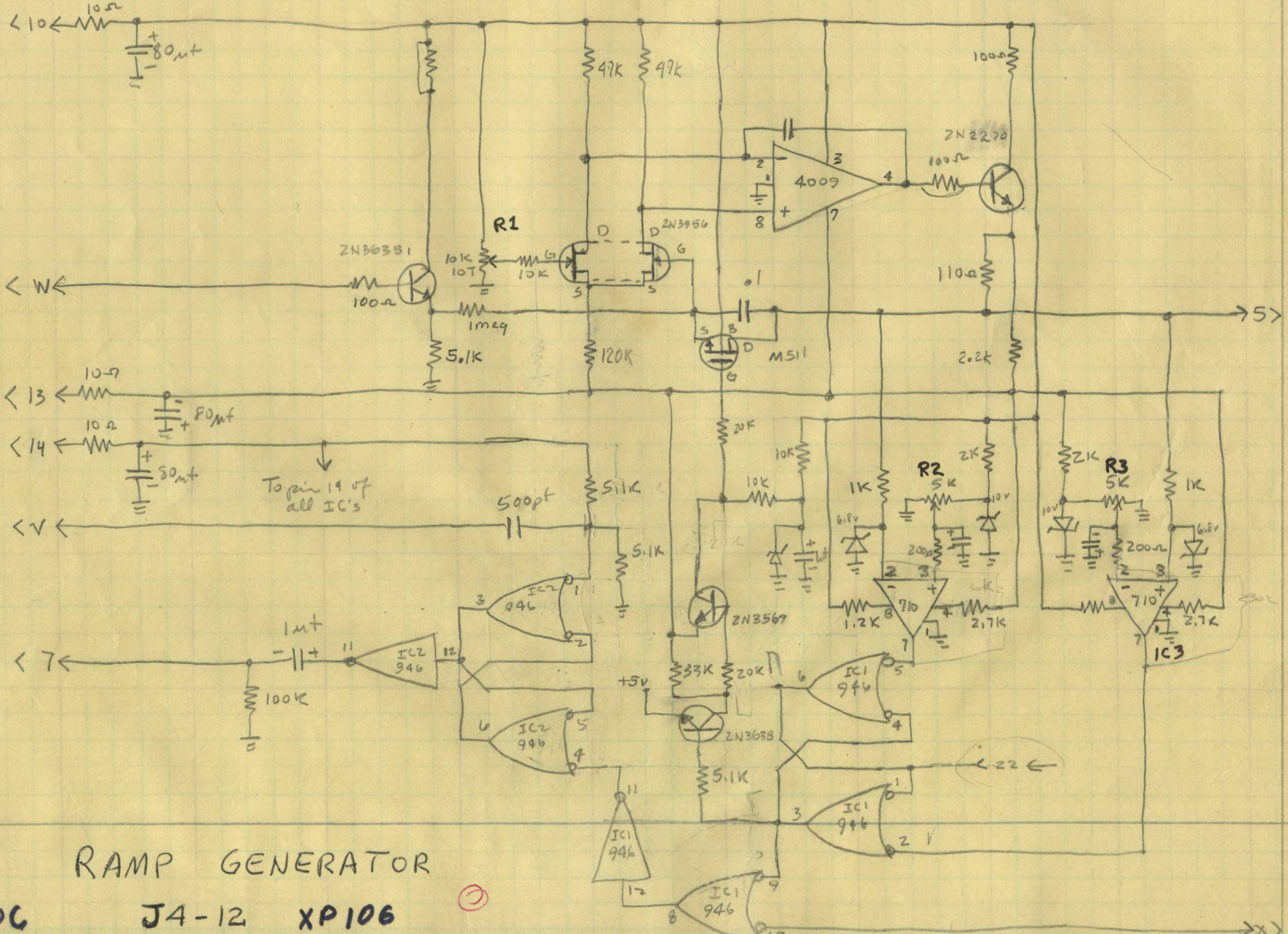


XP 105

COMMUTATOR CONTROL

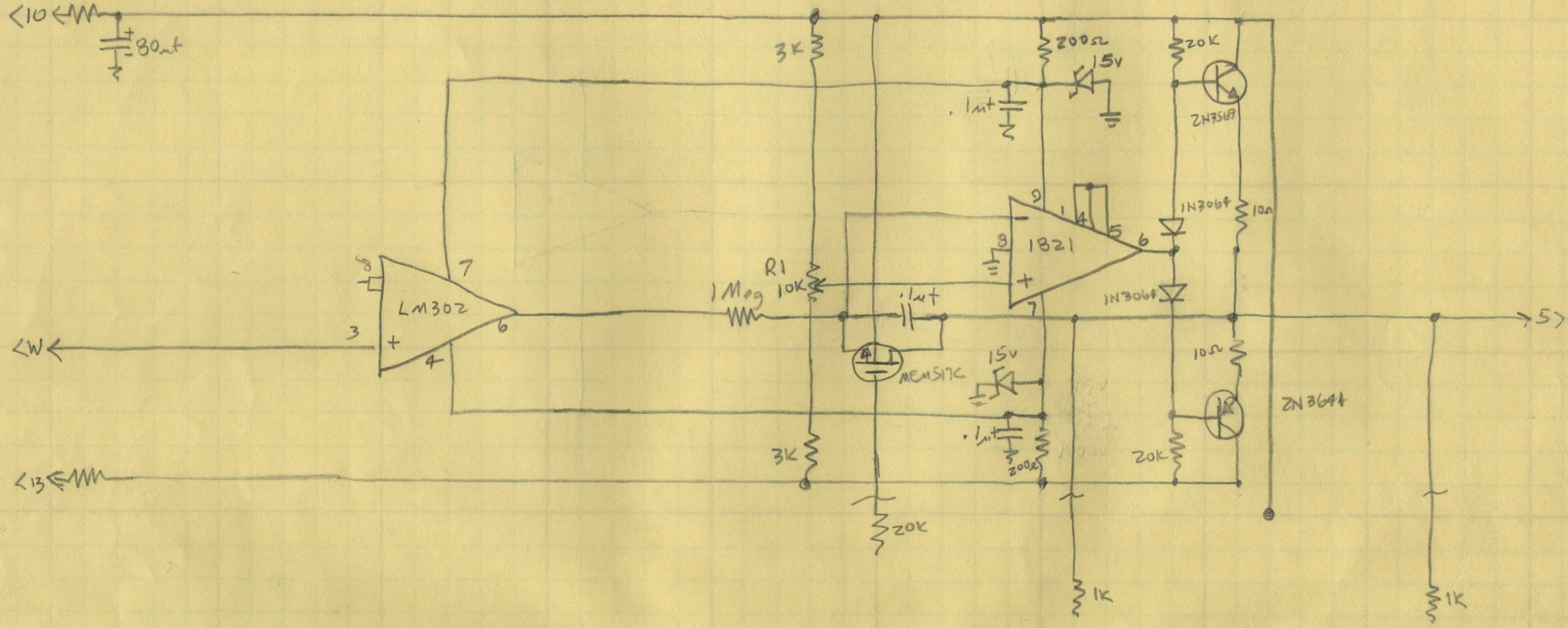
XP105

RAMP GENERATOR

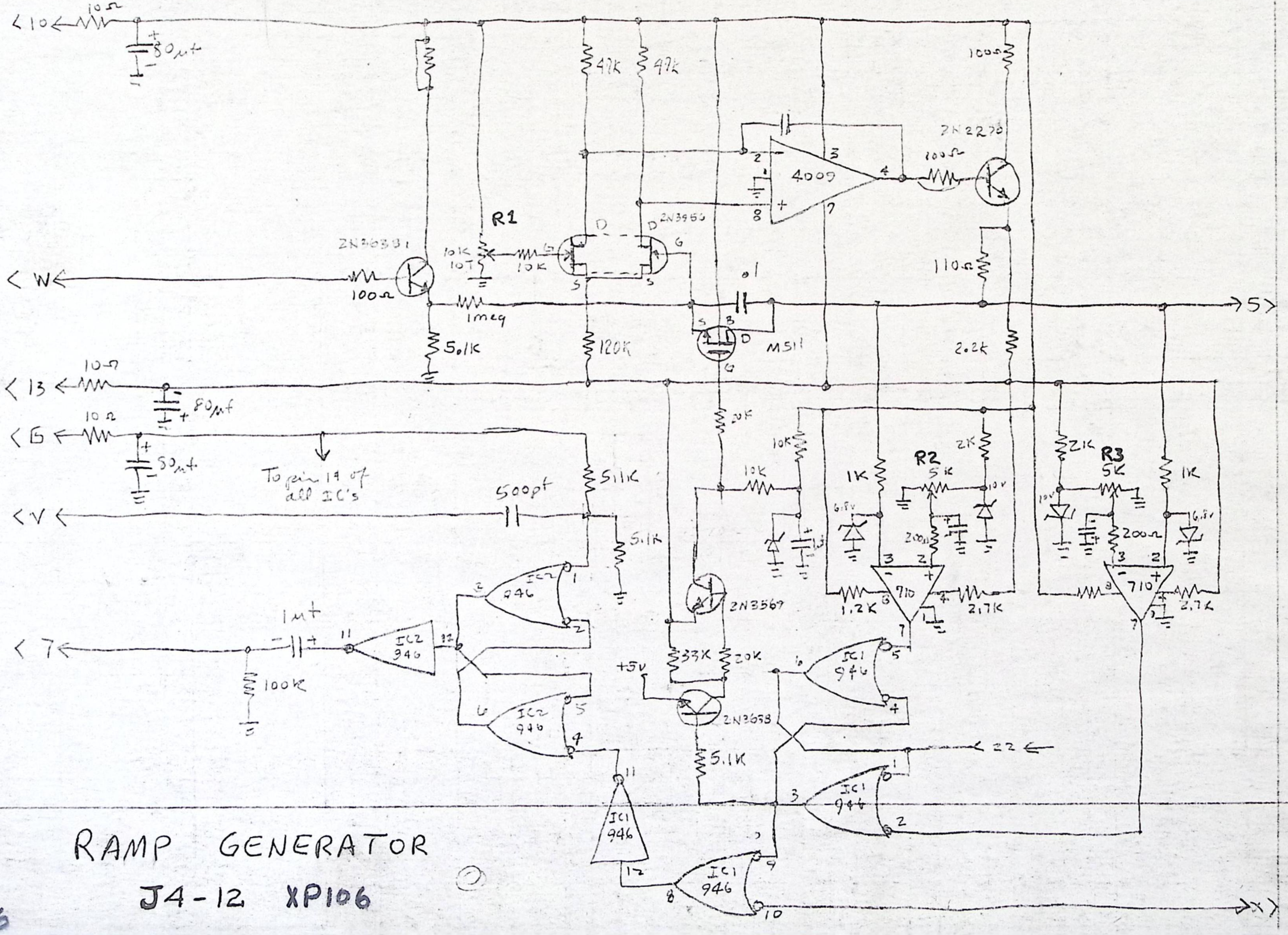


XP106

J4-12 XP106



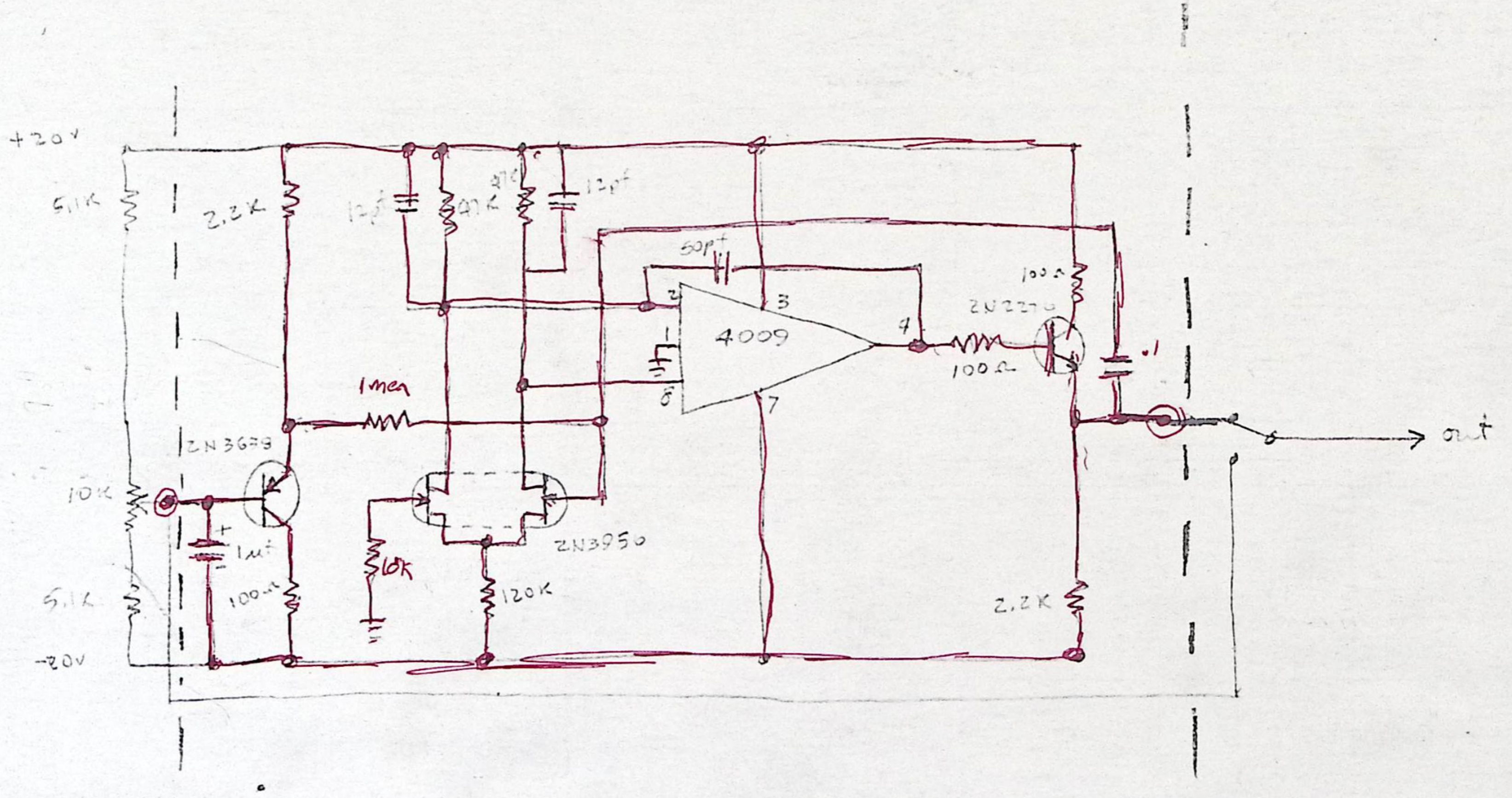
J4-12   XP 106   Ramp Generator



RAMP GENERATOR

J4-12 XP106

XP106

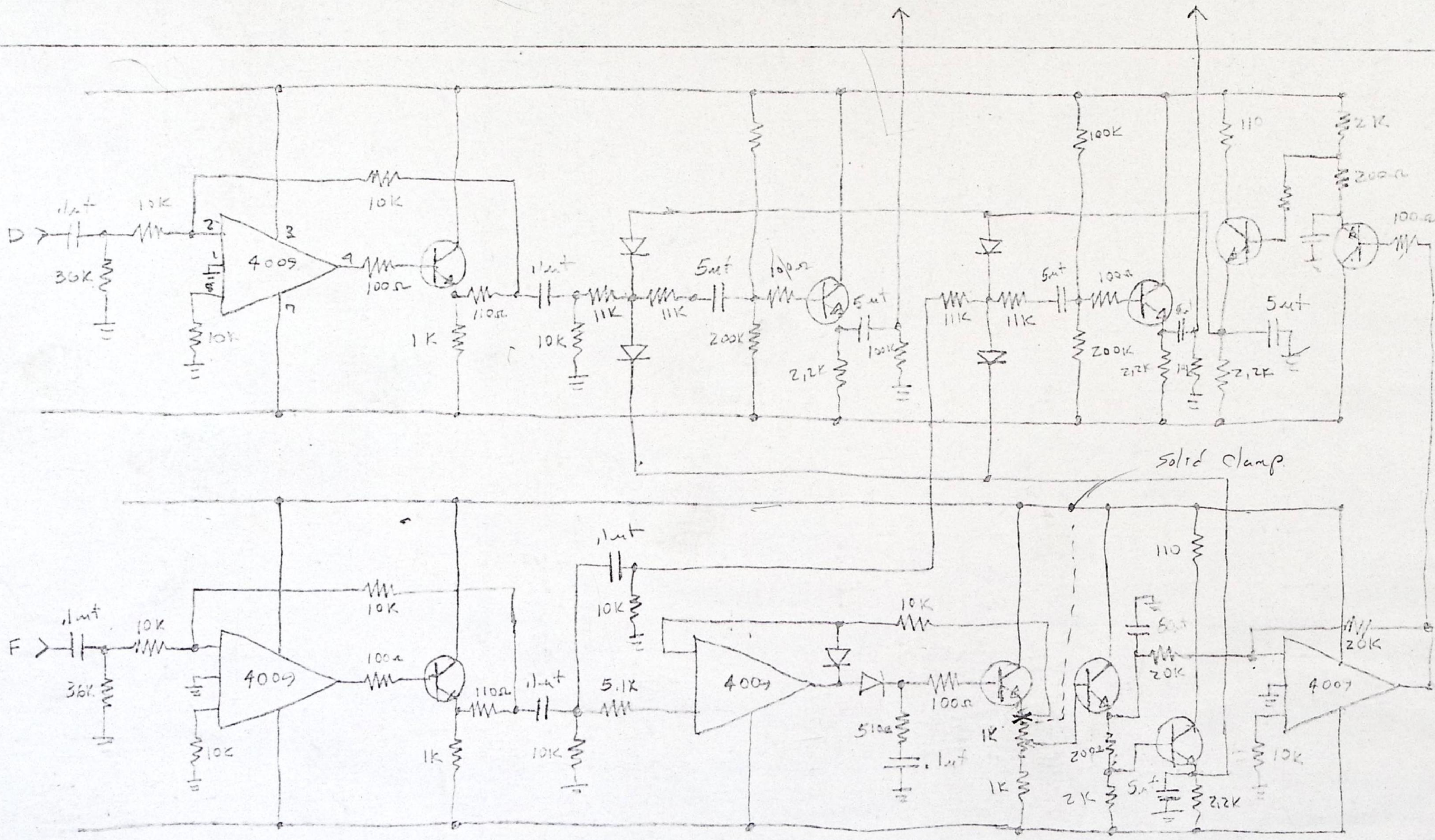


Manual Input (Rate Control)

INTEGRATOR XP107

USED FOR DRIVING OR FLYING SYM.

XP107

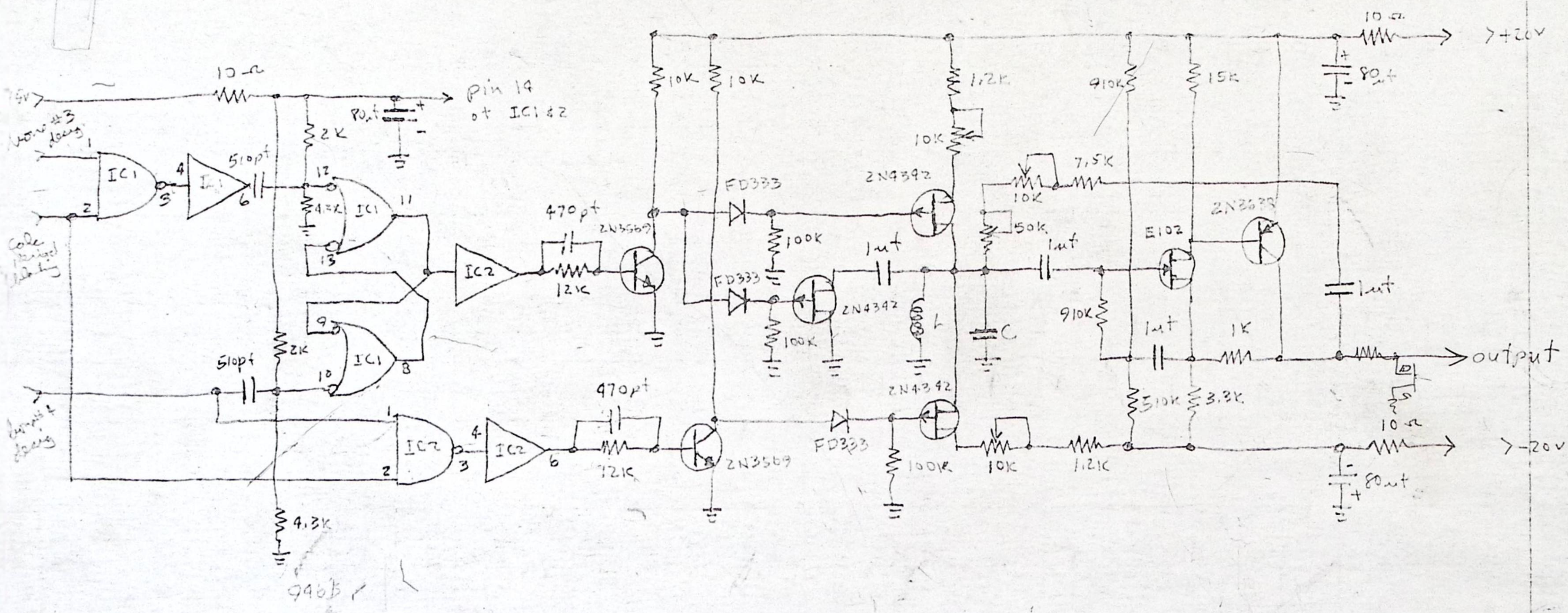


round
long flat
[illegible] round
short flat

SQUARING CKT.

JS-24

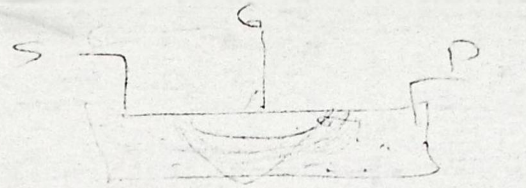
XP108



Mouth Gated Oscillator 8/21/68

XP109

XP109

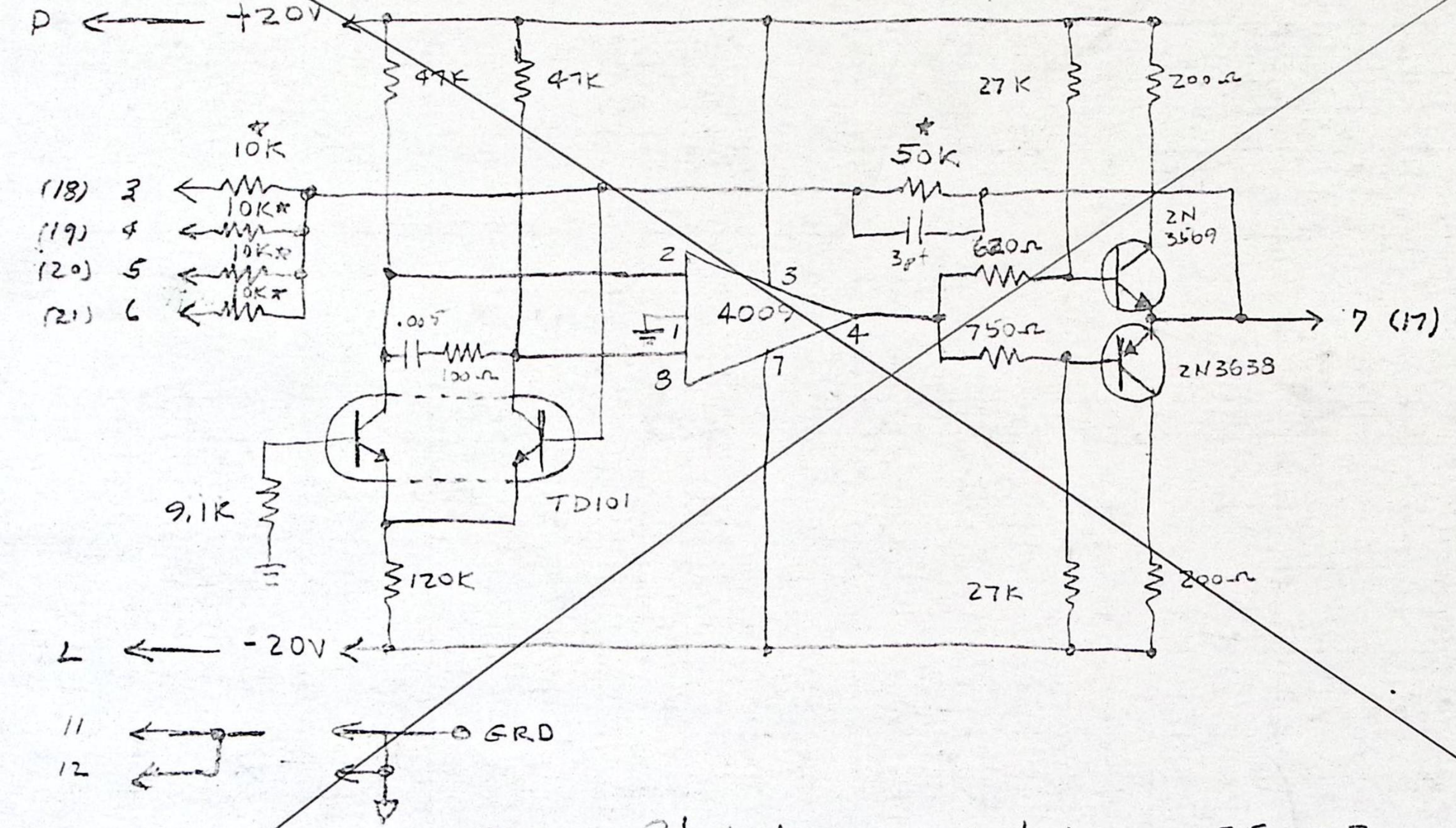


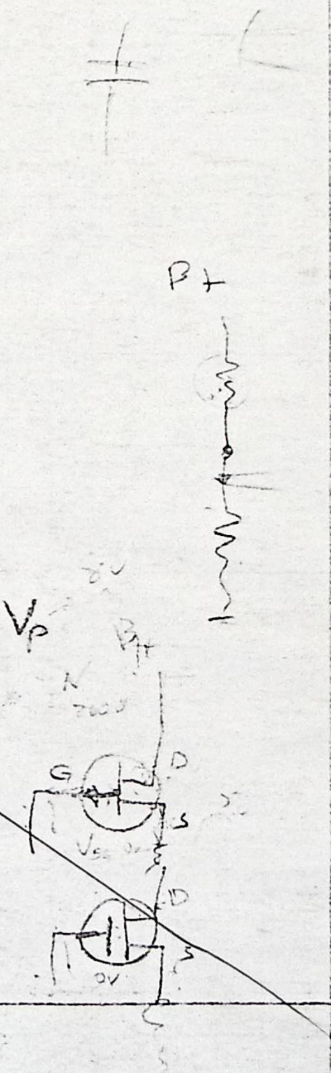
±10V @ 50KC int 1KΩ

±6V @ 100KC into 1KΩ

±5V @ 100KC " 100Ω

+-5V



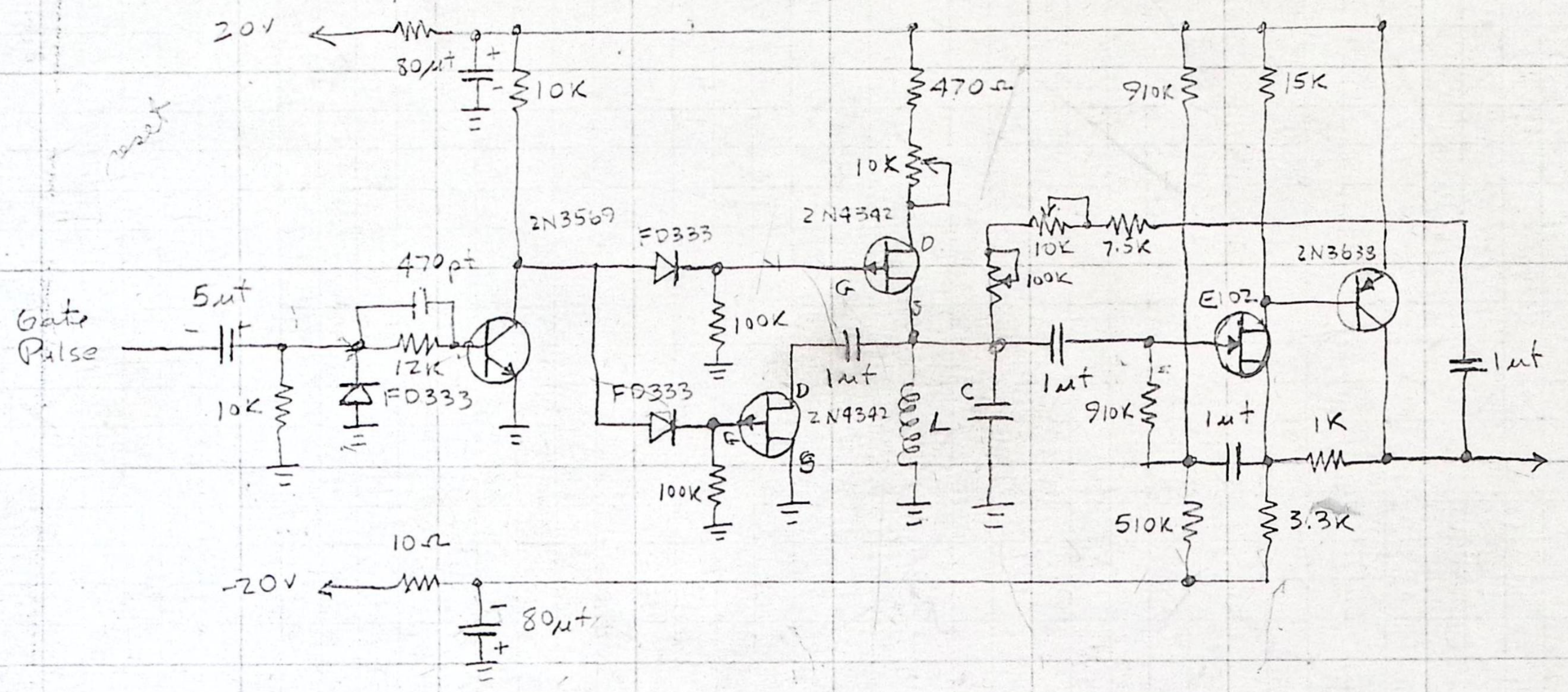


2 on a Bd to be mounted in J5-22

X 5 SUMMING AMP

J5-22

XP110

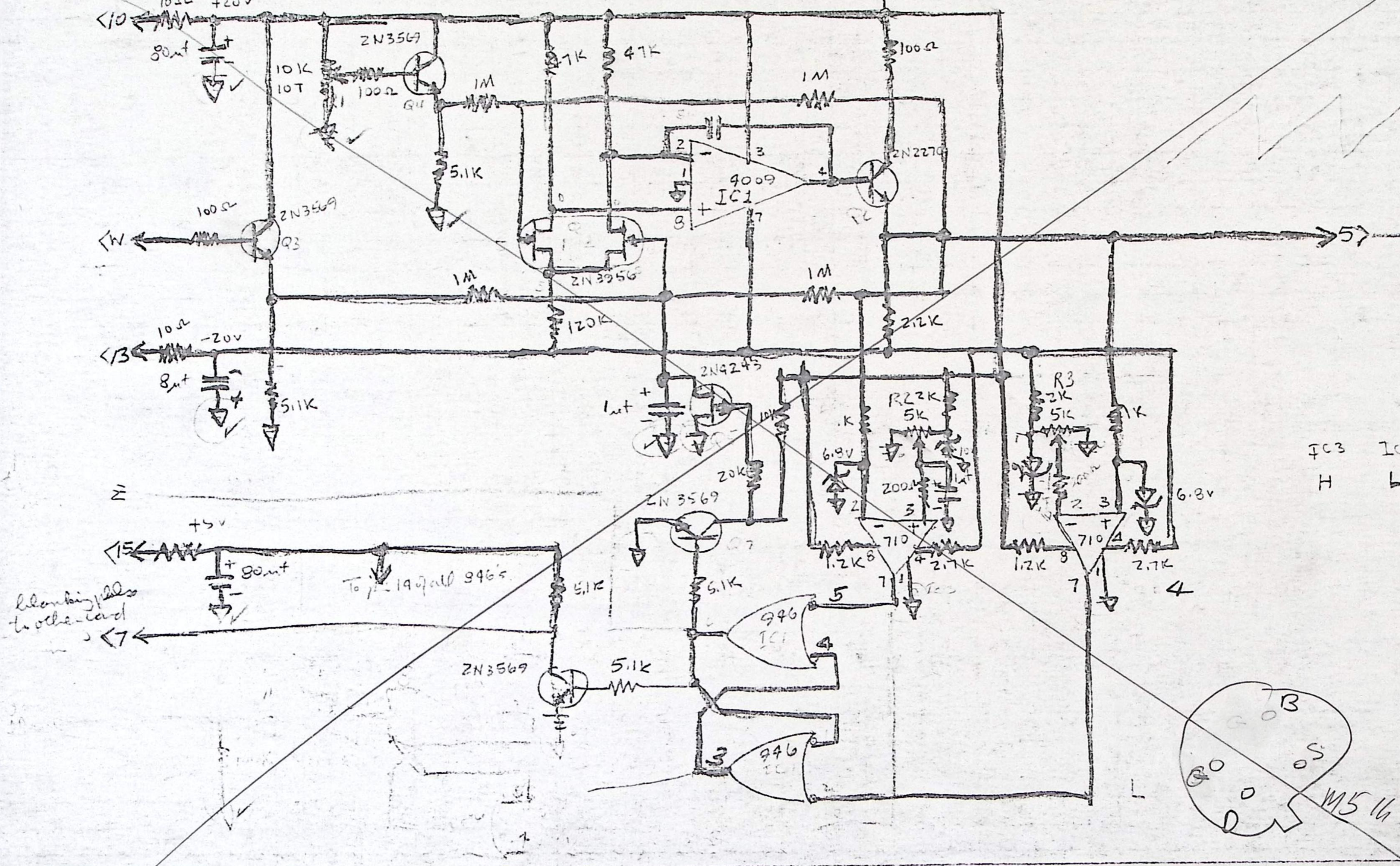


Gated Oscillator

XP111

J4-16

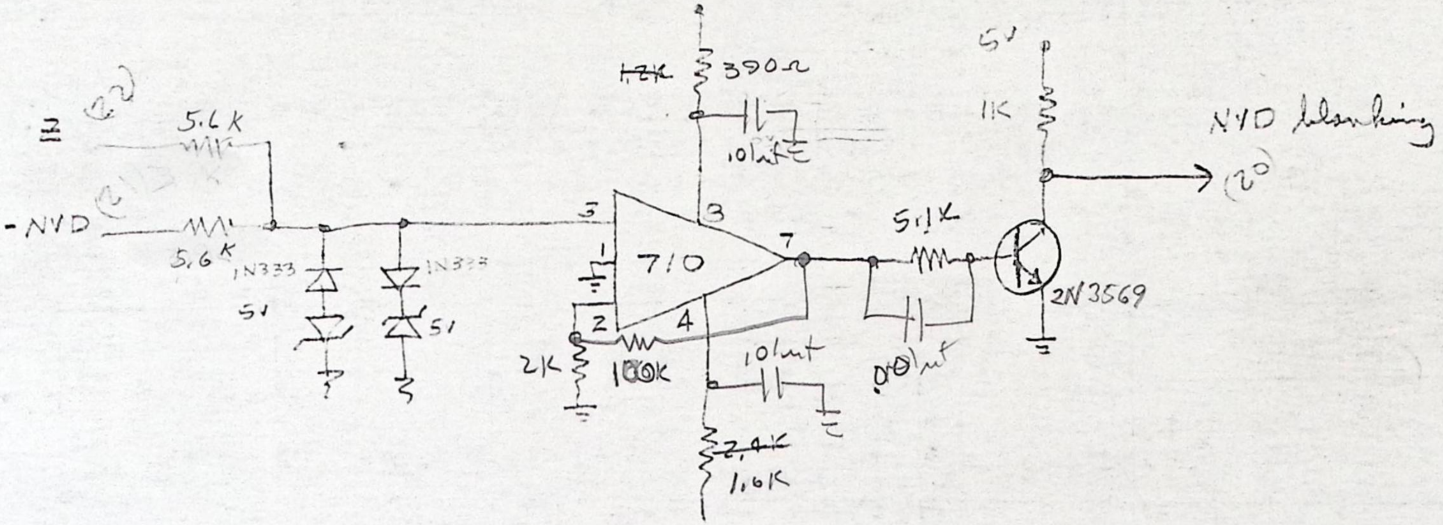
4



RAMP GENERATOR
WITH BLANKING
J4-16

XP112

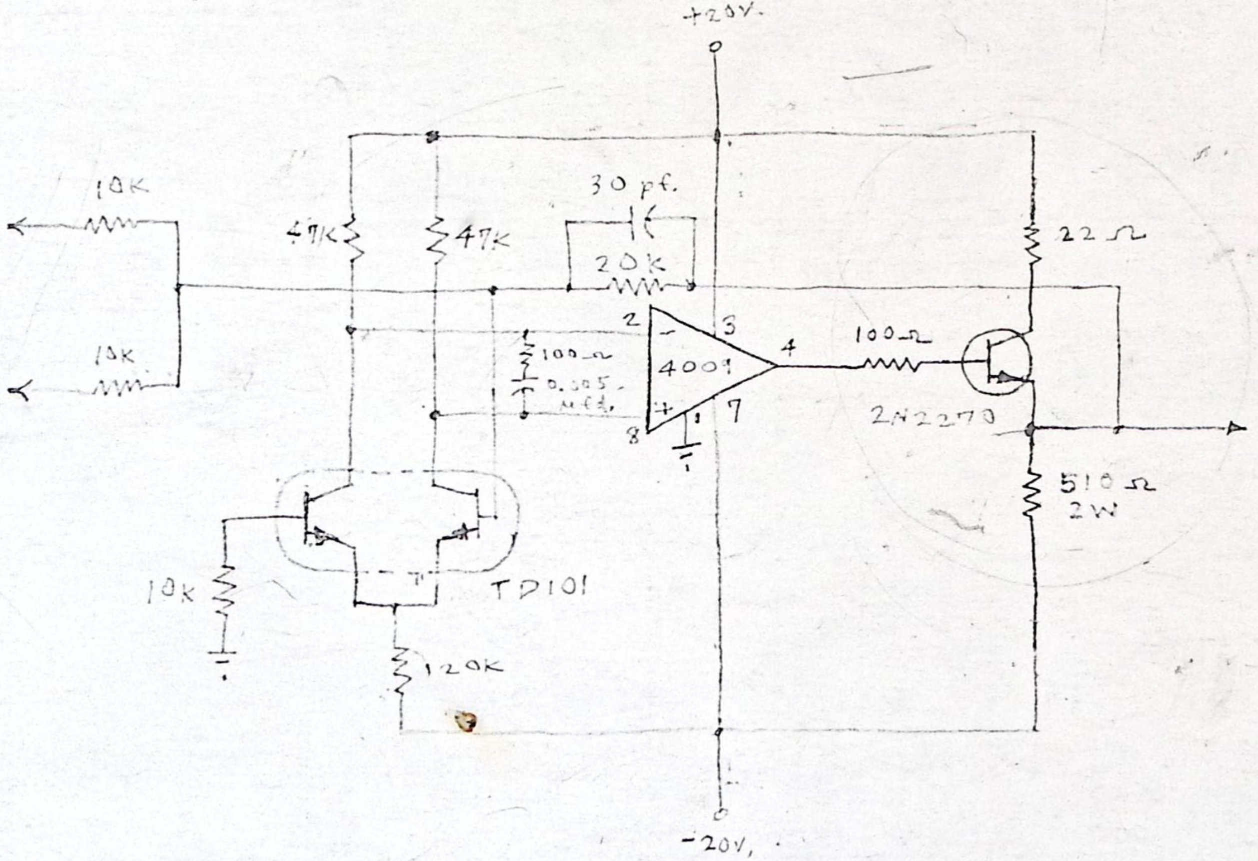
M511



On J4-16

BLANKING

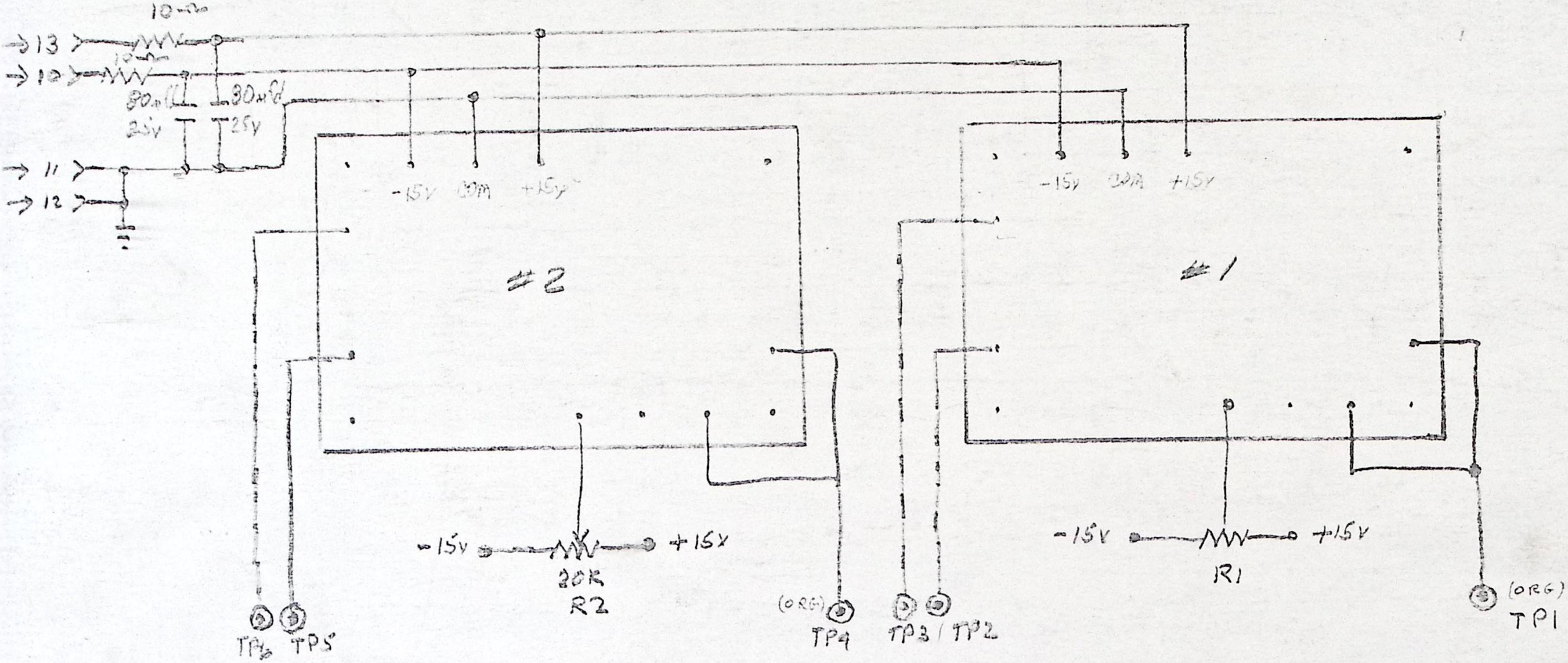
ON
XP112



COORDINATE ROTATION
SUMMING AMPLIFIERS

four ON EACH
BOARD

XP114
XP115
XP116

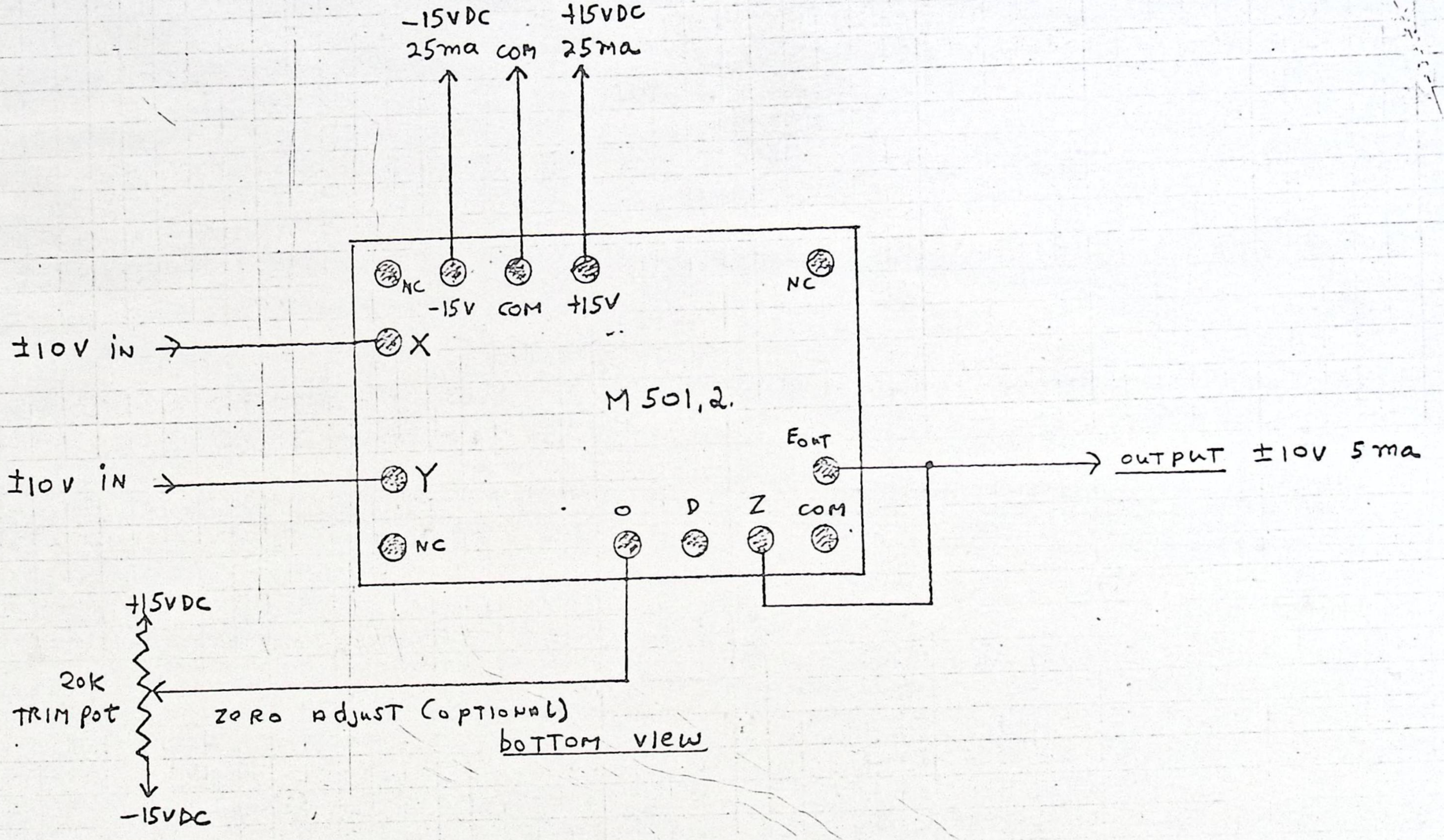


ANALOG MULTIPLIER

INTRONICS

XP117

611dX

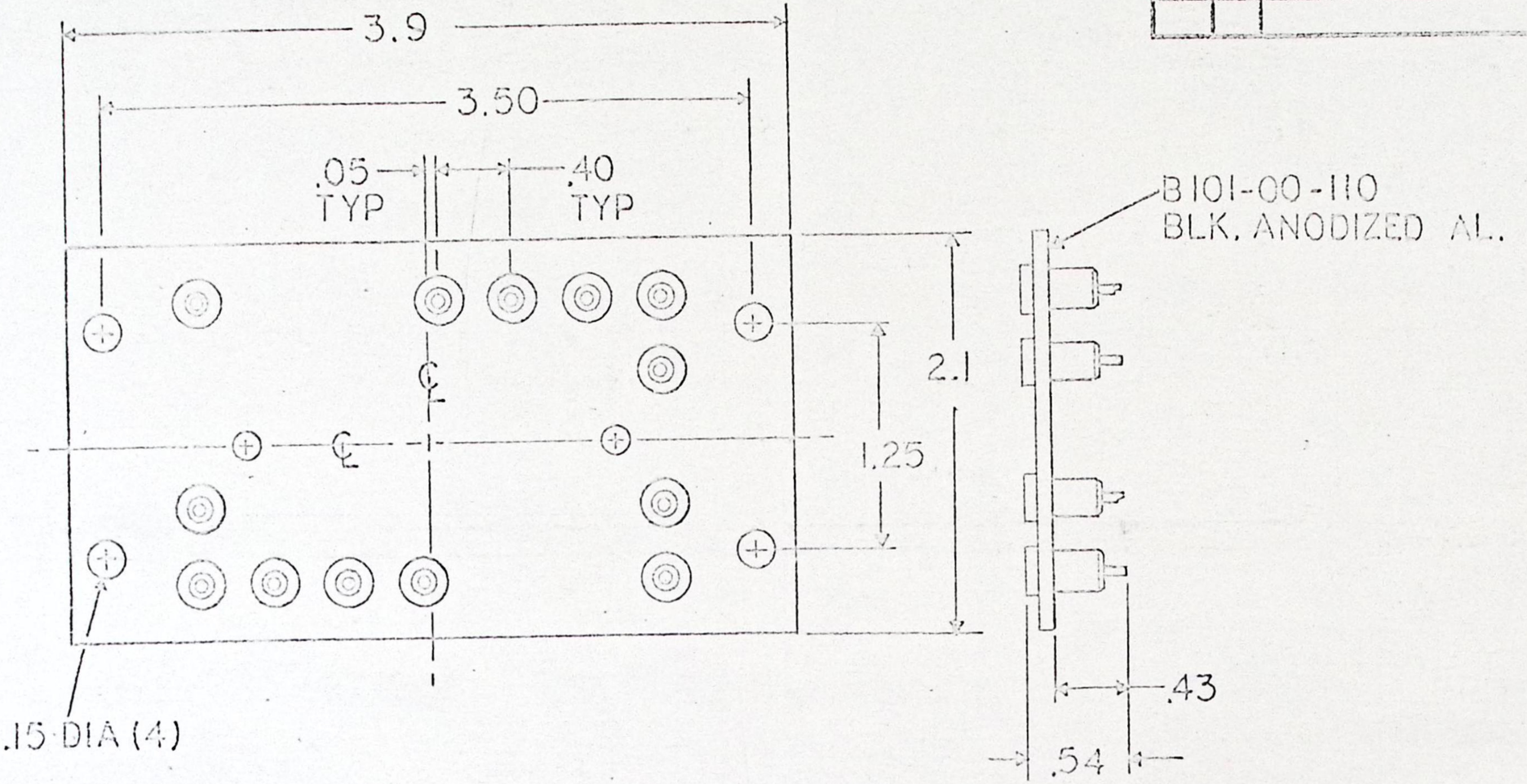


BOTTOM VIEW

M 501 M 502 MULTIPLIER
MULTIPLICATION MODE CONNECTION

INTRONICS INC
9/3/68

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.



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TOLERANCES
(EXCEPT AS NOTED)

INTRONICS INC.
NEWTON, MASS

DECIMAL ± —
FRACTIONAL ± —
ANGULAR ± —

SCALE —
DRAWN BY TS
APPROVED BY T.S

TITLE: S101 SOCKET

DATE 4-1-67
DRAWING SIZE A
NUMBER 101-02-135
REV

K&E ALBANENE © 10 5463
ENGINEERS' STANDARD FORM

MADE IN U.S.A.
20335

XP 117

intronics

M 501

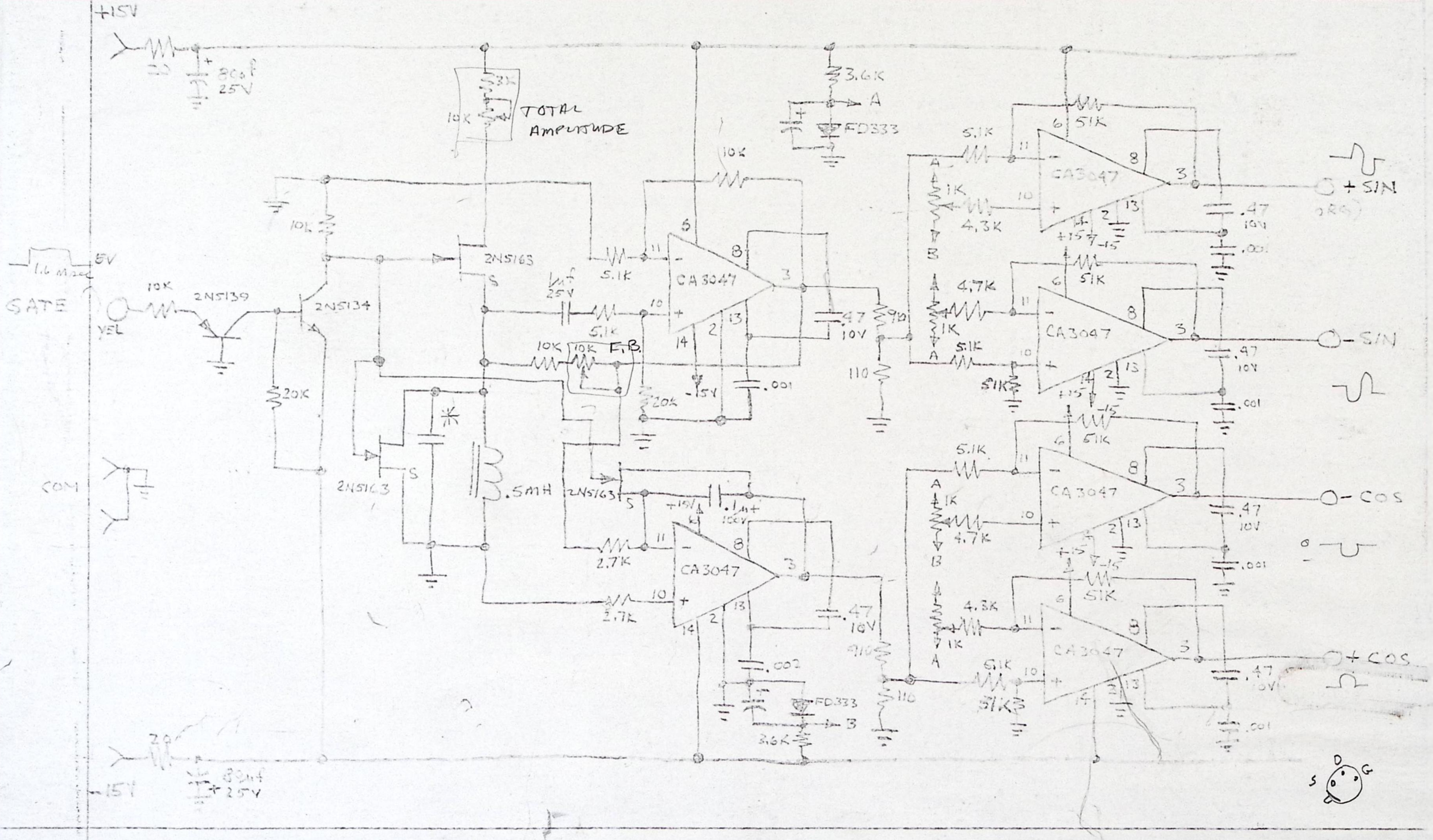
WIDEBAND ANALOG MULTIPLIER

DC TO ONE MEGAHERTZ TRUE FOUR QUADRANT MULTIPLIER

SPECIFICATIONS

Accuracy	1%
X Input	±10V AC or DC Max.
Y Input	±10V AC or DC Max.
XY/10 Output	±10V Max.
Output Current	5 mA Max.
Input Impedance	10K ohms Min.
Output Impedance	1 ohm Max.
Output Bandwidth, -3dB	DC to 1MHz
Power Supply Requirement	±15V, 20 mA
Operating Temperature Range	-25°C to +85°C
Size	3" X 2" X .625" (Identical to M101)
Socket	S101
Price	M501 $295.00 S101 $ 8.50

1/4/68



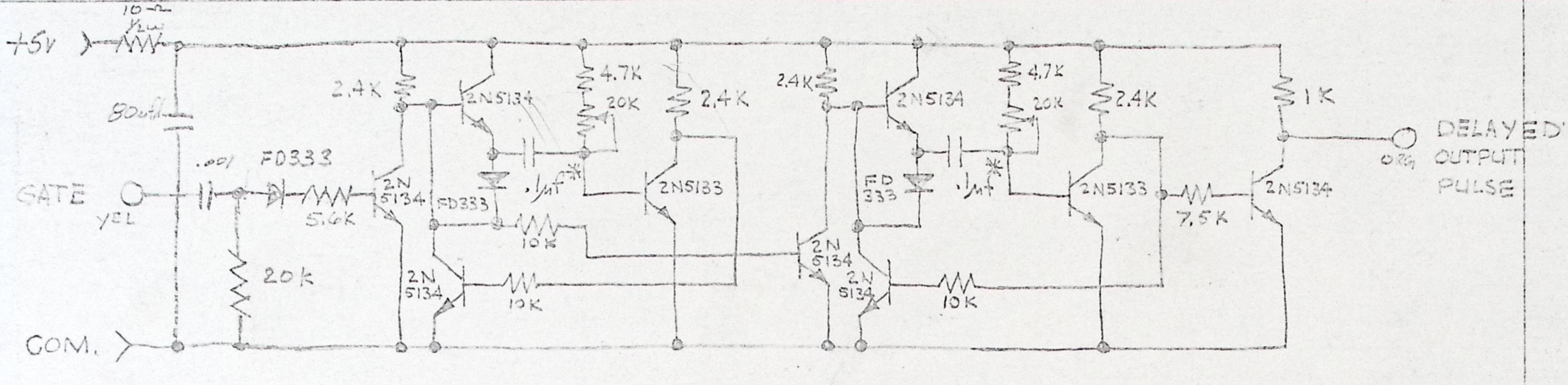
CIRCLE BONE

(GATED ± SINE, ±COSINE GENERATOR)

* ≈ .15µf
(PARALLEL & USE POLYSTYRENE)

YP118

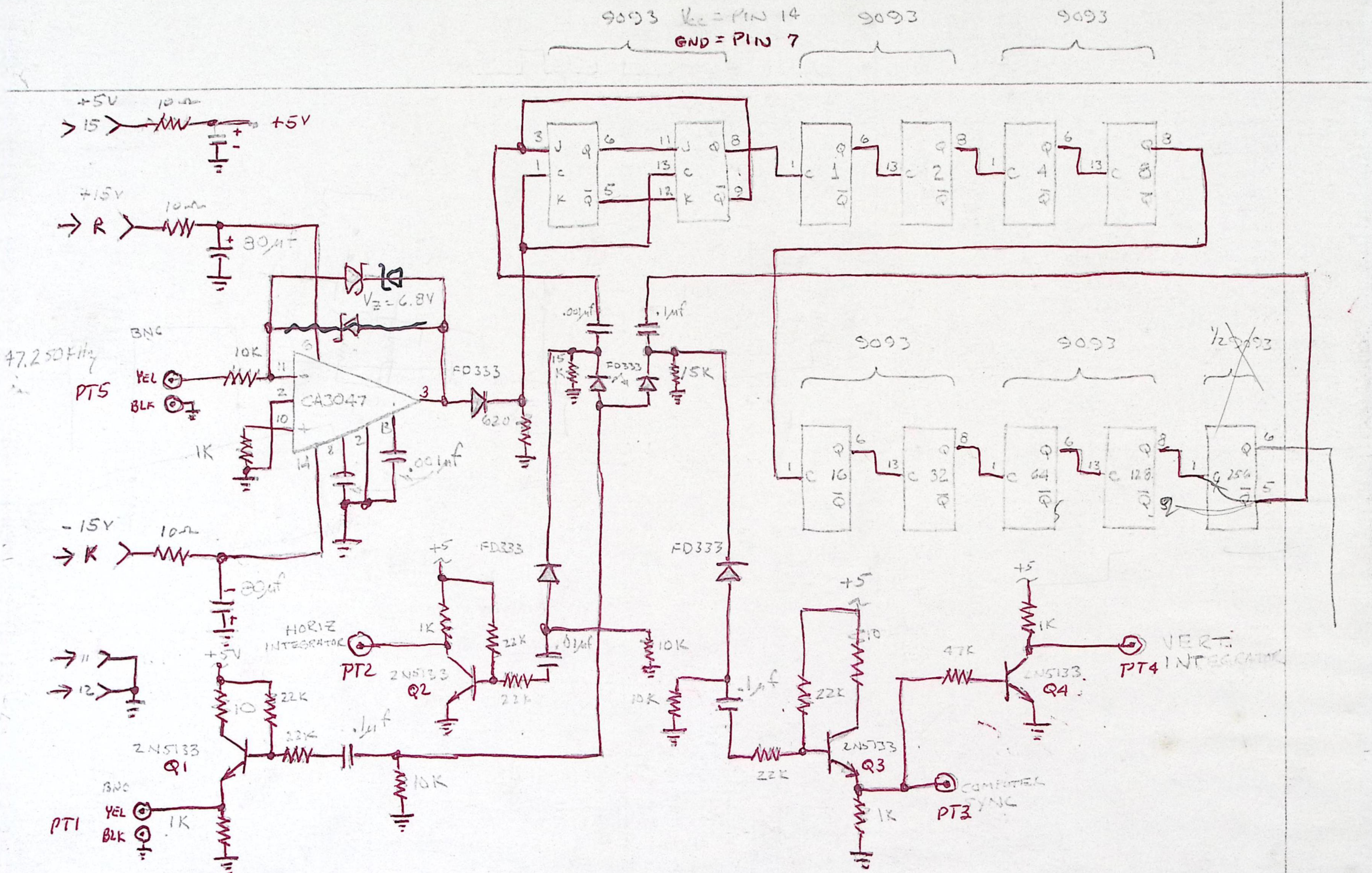
11/7/68



FOUR ON A CARD

CIRCLE BONE BLANKER

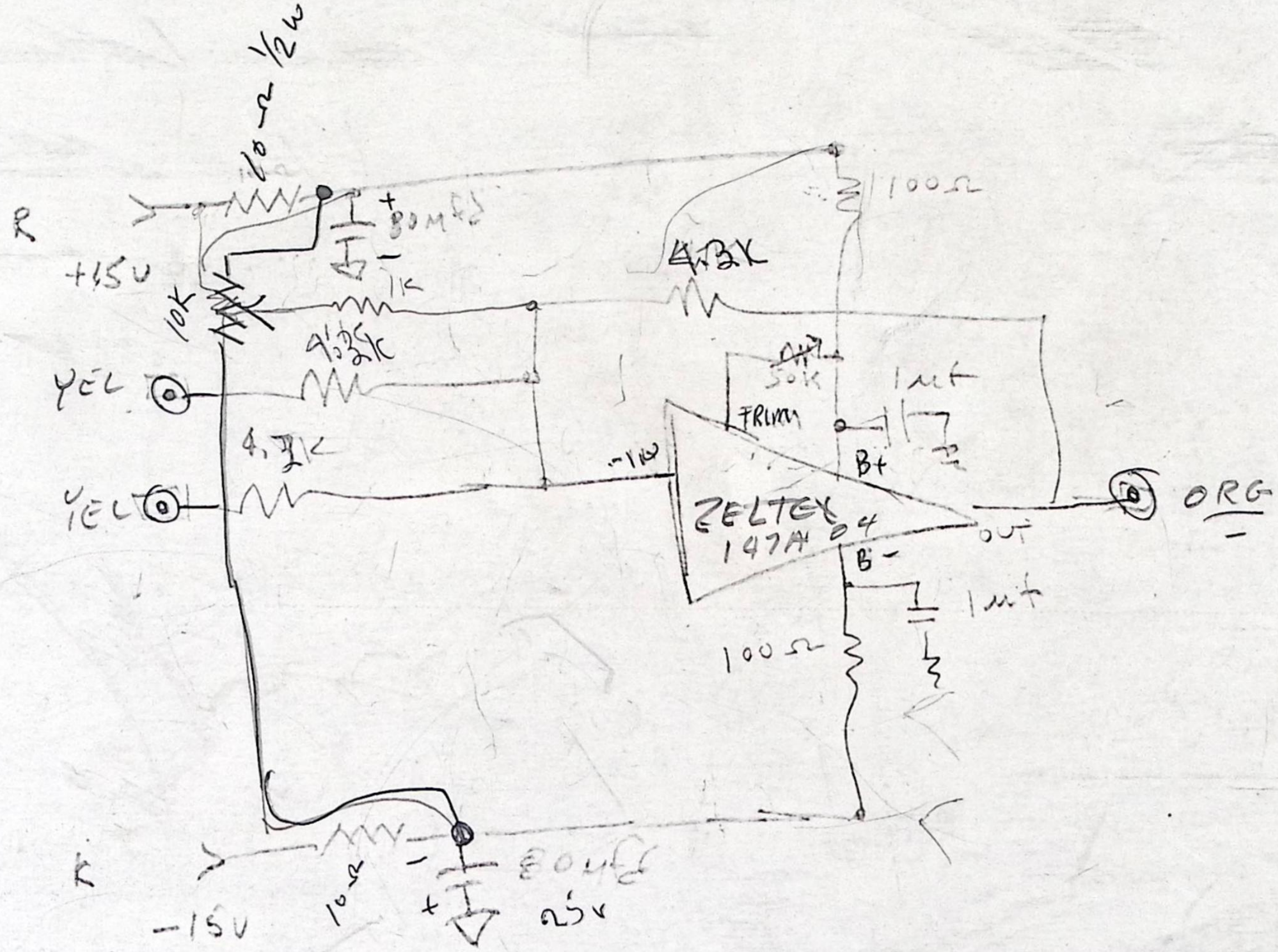
XP119

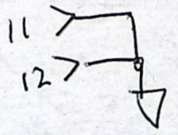


TV CAMERA / COMPUTER INTERFACE & SYNC

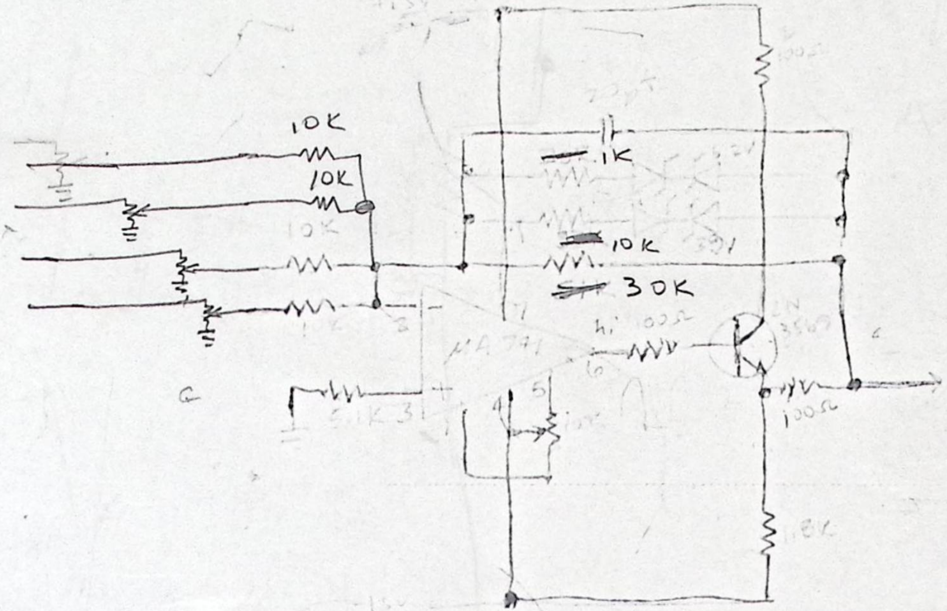
XP120

11/20/69 DUCA


10 Ω 1/2W
R
+15V
+
80mfd
−
10K
1K
4.32K
YEL
4.7K
YEL
100Ω
4.32K
50K
TRIM
1 mf
B+
−IW
ZELTEX
147A
04
OUT
B−
1 mf
100Ω
ORG
K
−15V
10Ω
−
80mfd
+
25V


11
12

XP121



51K : $A = 5.1$ $0 < e_o < 3.9V$

$= 2$ $3.9v < e_o < 6.2$

33K $= 1$ $6.2 < e_o <$

20K

30K $A = 3$ $0 \; e_o < 3.9V$

$A - 0.75$ $3.9v < e_o < 6.2V$

10K $A = 0.088$ $6.2v < e_o$

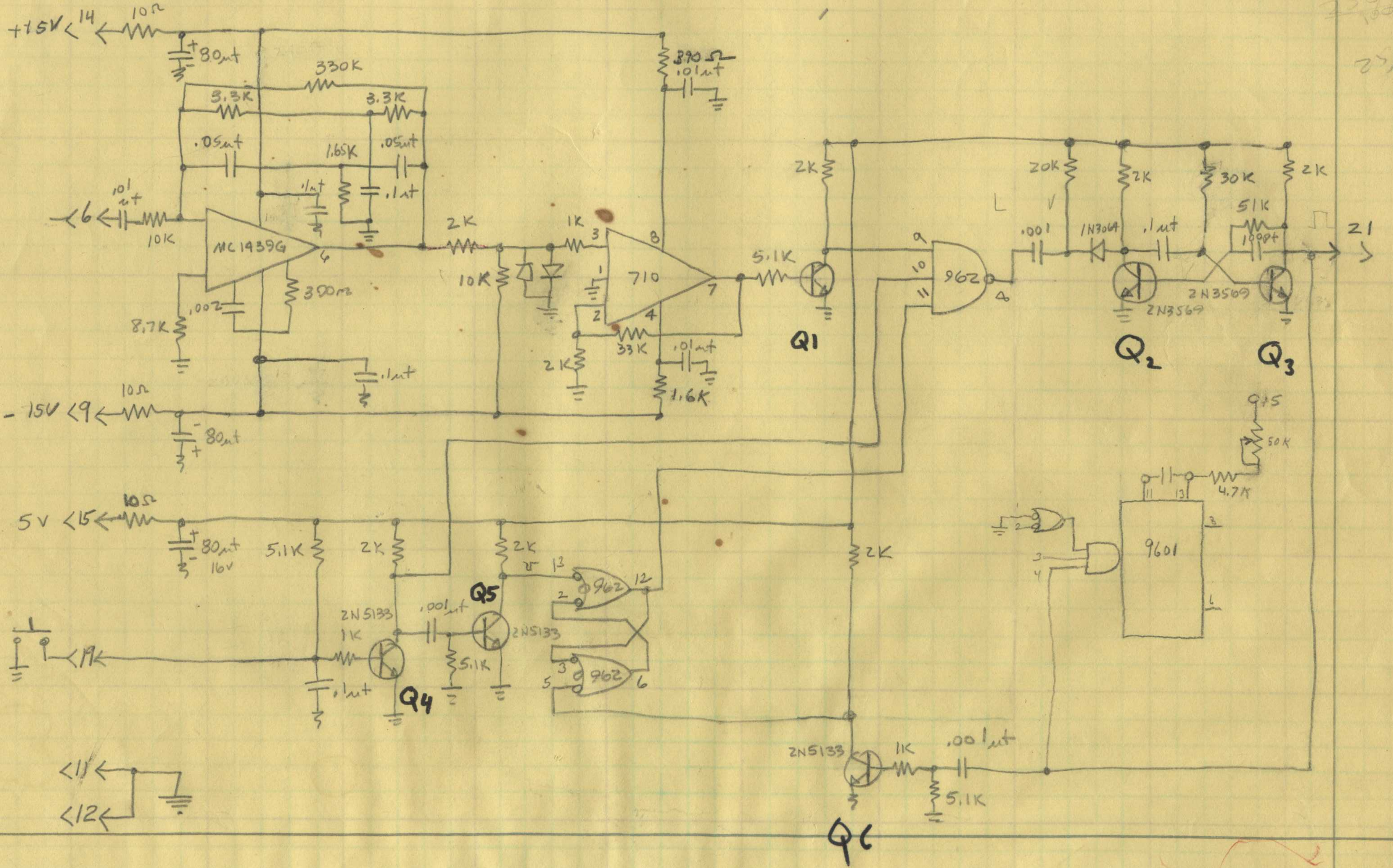
7.5K

3 on board

Non-Linear Amplifier
(for Lips)

1/11/69

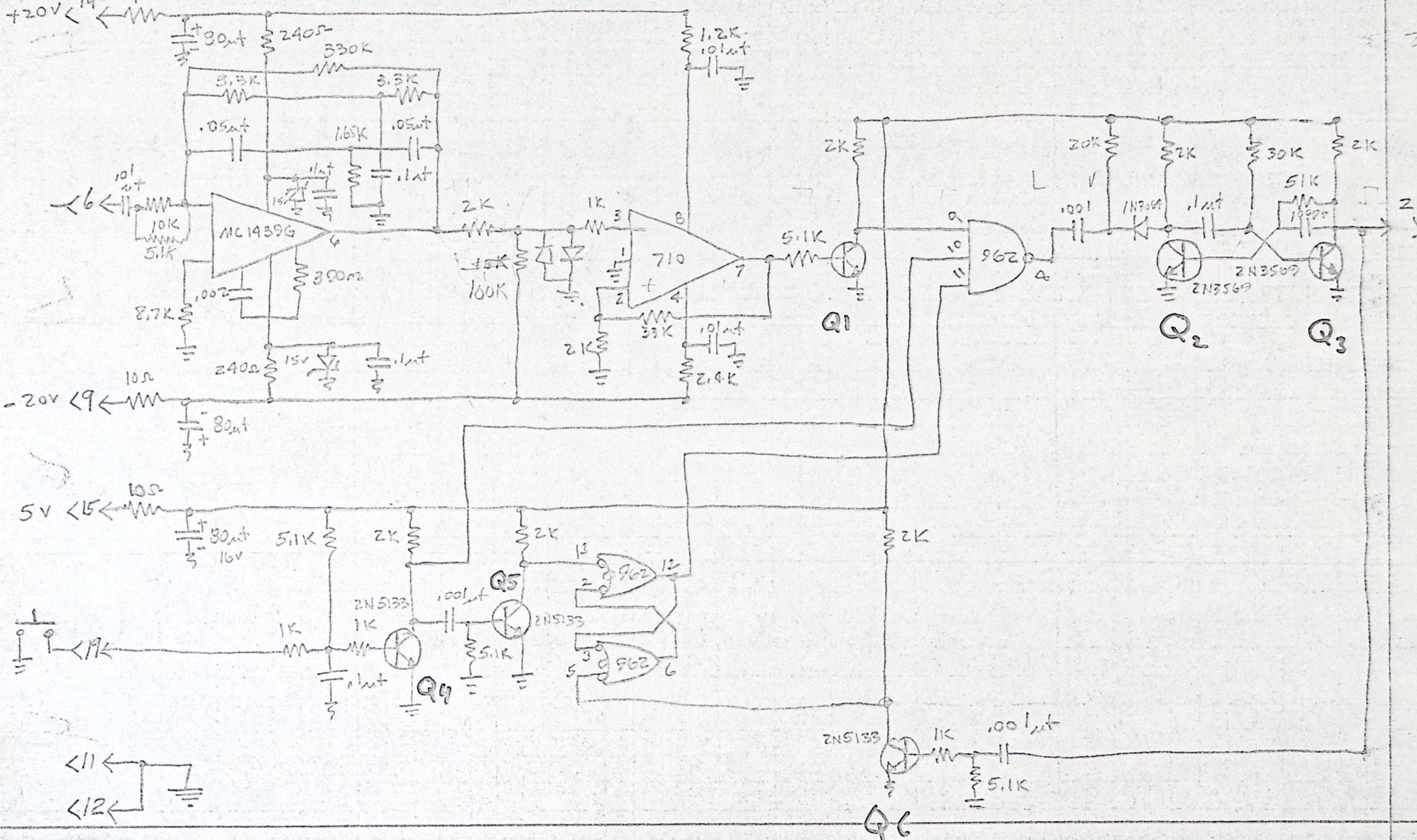
XP 122



Film Flagger

2/11/69

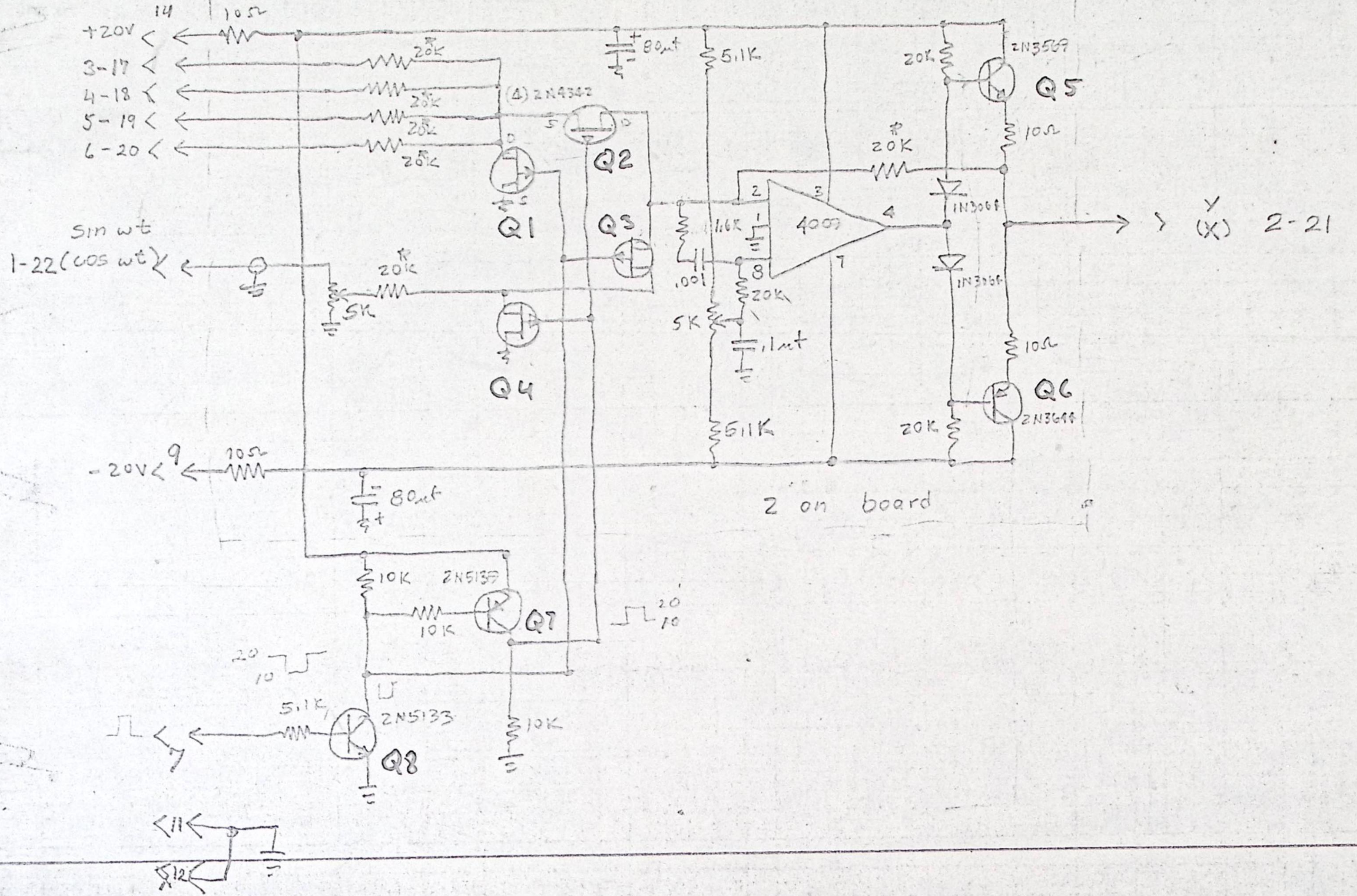
X P-123



Film Flagger A

2/11/69

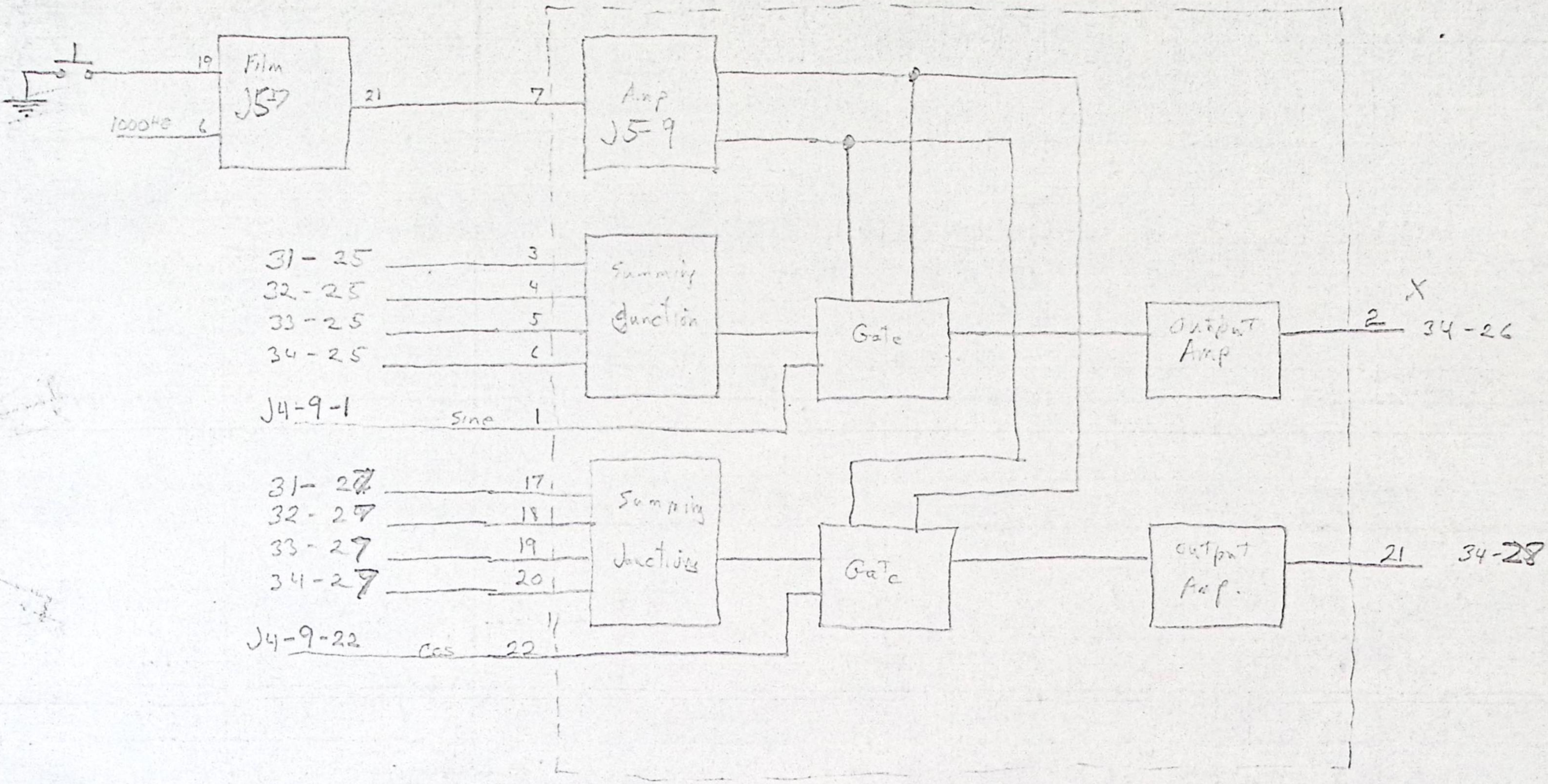
JS-P7
XR-123



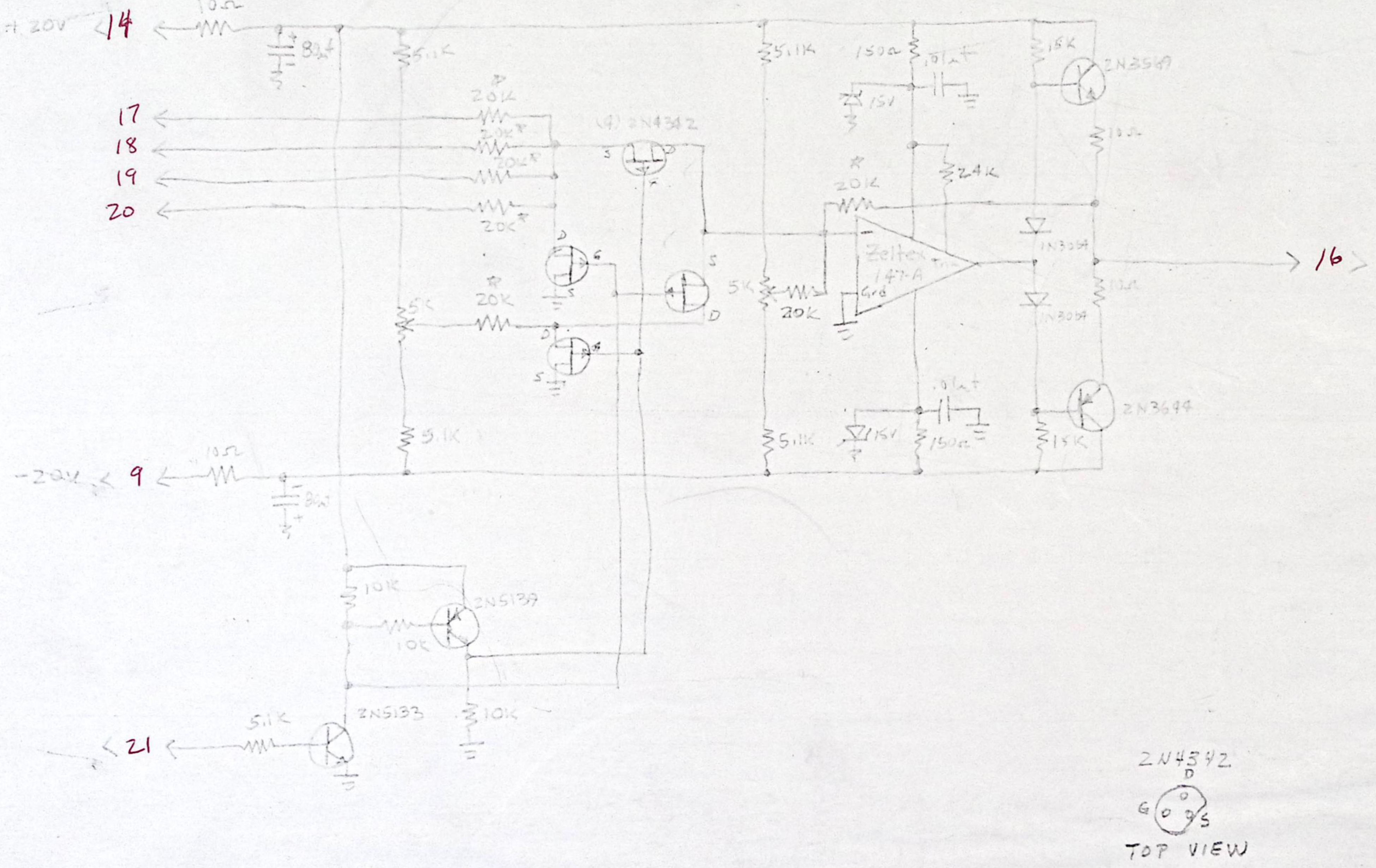
Film Flagger B

2/11/69

JS-P9
XP-124



Film Flagging Circuit.



Intensity Output Amp

3/17/69

XP125

761-0101

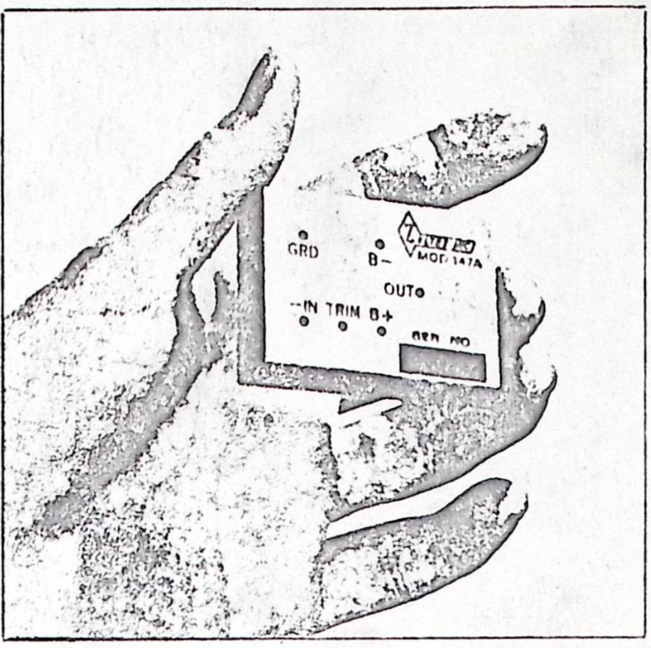
U-HILLER

794-4279 HILLEPKY
ELECT. INST. ASS.

ZELTEX, INC.
1000 CHALOMAR ROAD
CONCORD, CALIF. 94520
PHONE (415) 686-6660
TWX 910-4819477

OPERATIONAL AMPLIFIER

Model 147A



- *High Slew Rate - 500 V/μs (min)*
- *Full Output to 7 MHz*
- *Fast Settling Time - 100 ns to 1%*
- *Gain-bandwidth Product : 20 MHz (min)*

GENERAL

The Zeltex Model 147A is an operational amplifier designed as a single-ended input inverting amplifier. It features wide bandwidth, high slew rate, and fast settling time--all primary requirements for high-speed applications. With these design features, the 147A is highly qualified for use in comparator, D to A converter, and iterative analog computer circuits.

The solid-state amplifier utilizes silicon semi-conductors throughout to provide a stable and rugged unit with an operating temperature range of -55°C to +85°C. Available in a new, smaller molded-plastic case, the amplifier can be flush-mounted on printed circuit cards or other type chassis.

OPERATING DATA

Input voltage offset is externally adjustable to zero with a 50K potentiometer connected between the B+ and TRIM leads of the amplifier. If no adjustment is required, a 25K resistor is connected between B+ and the TRIM terminals during operation.

A power supply capable of generating ±15 VDC @ 15mA quiescent current is required for proper operation of the 147A. The amplifier has a full-output frequency of 2MHz at the rated load (±10V @ 30 mA). From 0 to 20 mA, the amplifier full-output frequency increases to 7 MHz. The output is short-circuit proof.

INVERTER

Wnen using the 147A with 1 kilohm input and feedback resistors and an external load of 10 mA, the frequency response is 10 MHz for a 10 V peak-to-peak signal. Settling time and rise time for the 1K - 1K inverter are given in the "Electrical Specifications".

PACKAGE

Zeltex case style N is used with the 147A amplifier. Physical dimensions, pin functions, and layout of the case style are shown in "Mechanical Specifications".

The style of the case allows flush-mounting or plug-in installation. Amplifier leads are centered on a 0.3 inch grid and are all located within a 0.6 x 0.9 inch area (see "Bottom View" of case layout). The case is mounted with two 4-40 machine screws on 1.2 inch centers.

P 125

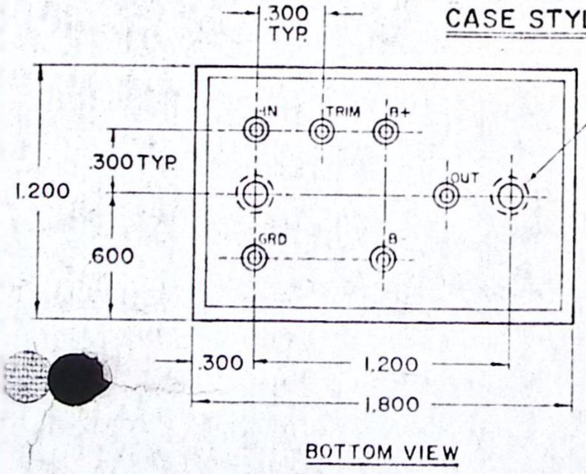
PERFORMANCE SPECIFICATIONS

(TYPICAL 25° C UNLESS OTHERWISE NOTED)

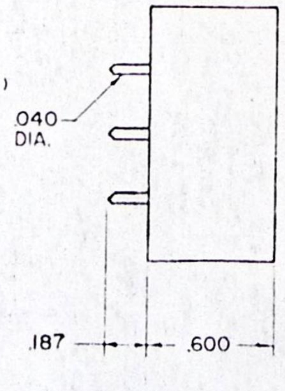
OUTPUT CHARACTERISTICS	
Voltage (peak)	± 10 V
Current	30 mA
Impedance (open-loop)	300 ohms
Full-Output Frequency	7 MHz (at 0 to 20 mA load) 2 MHz (at rated load)
GAIN CHARACTERISTICS	
DC Voltage Gain	100,000 (min) at rated load
Gain-Bandwidth Product	20 MHz (min)
Gain Roll-off Rate	-6 dB/octave
INPUT CHARACTERISTICS	
Voltage Offset	Externally adjustable to zero
Voltage Drift @ (-25°C to +85°C)	10 μV/°C (typ), 25 μV/°C (max)
Bias Current	10 nA (typ), 25 nA (max)
Current Drift @ (-25°C to +85°C)	0.5 nA/°C (typ), 1 nA/°C (max)
Input Impedance	200 kilohm @ dc, 5 kilohm above 1 kHz
Noise (dc to 25 kHz)	20 μV, peak
SLEW RATE	500 V/μs (min) @ 0 to 20 mA load, 300 V/μs @ rated load
POWER REQUIREMENT	±15 VDC @ 15 mA quiescent
OPERATING TEMPERATURE RANGE	-55°C to +85°C
1K - 1K INVERTER CHARACTERISTICS (10 mA load)	
Frequency Response	10 MHz (10 V p-p)
Rise Time	20 ns (for 10 V step)
Settling Time	5 μs to 0.01%, 100 ns to 1% (10 V step)

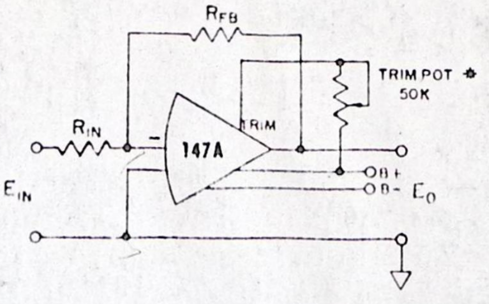
MECHANICAL SPECIFICATIONS

CASE STYLE N



BOTTOM VIEW

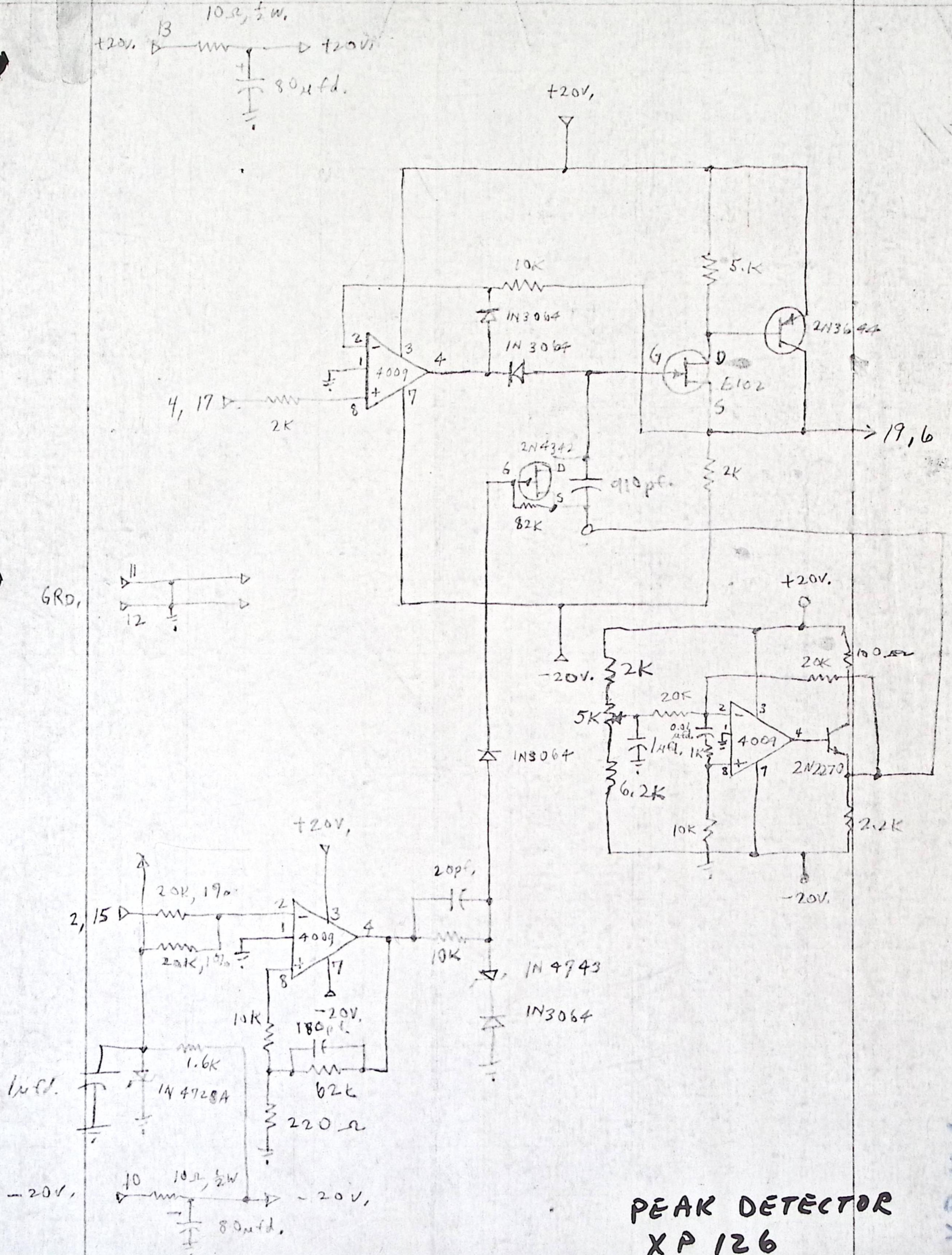




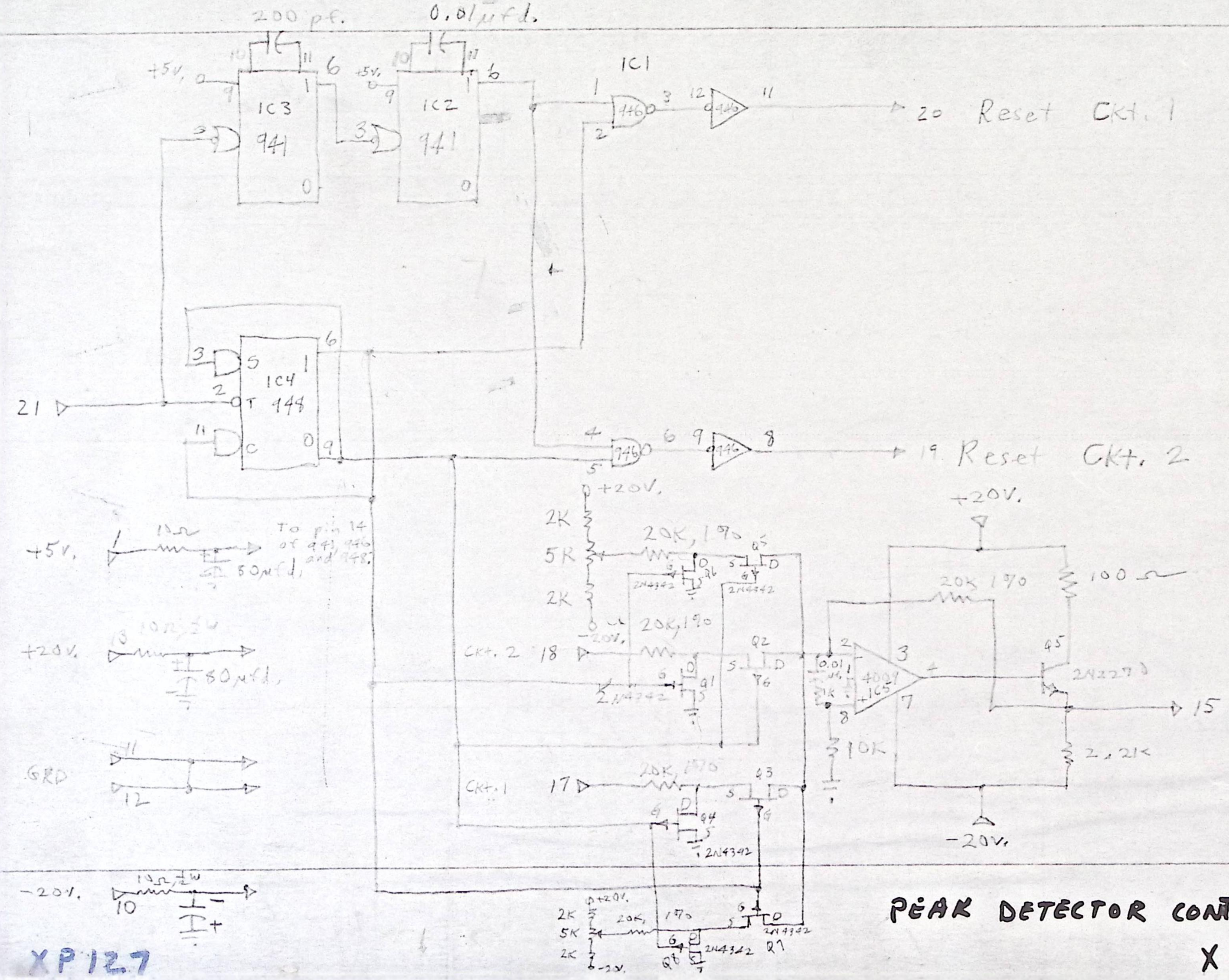
* EXTERNAL COMPONENTS NOT SUPPLIED

NOTE: ZELTEX MATING CONNECTOR MC18 EXTRA

THO IN USA 8/67



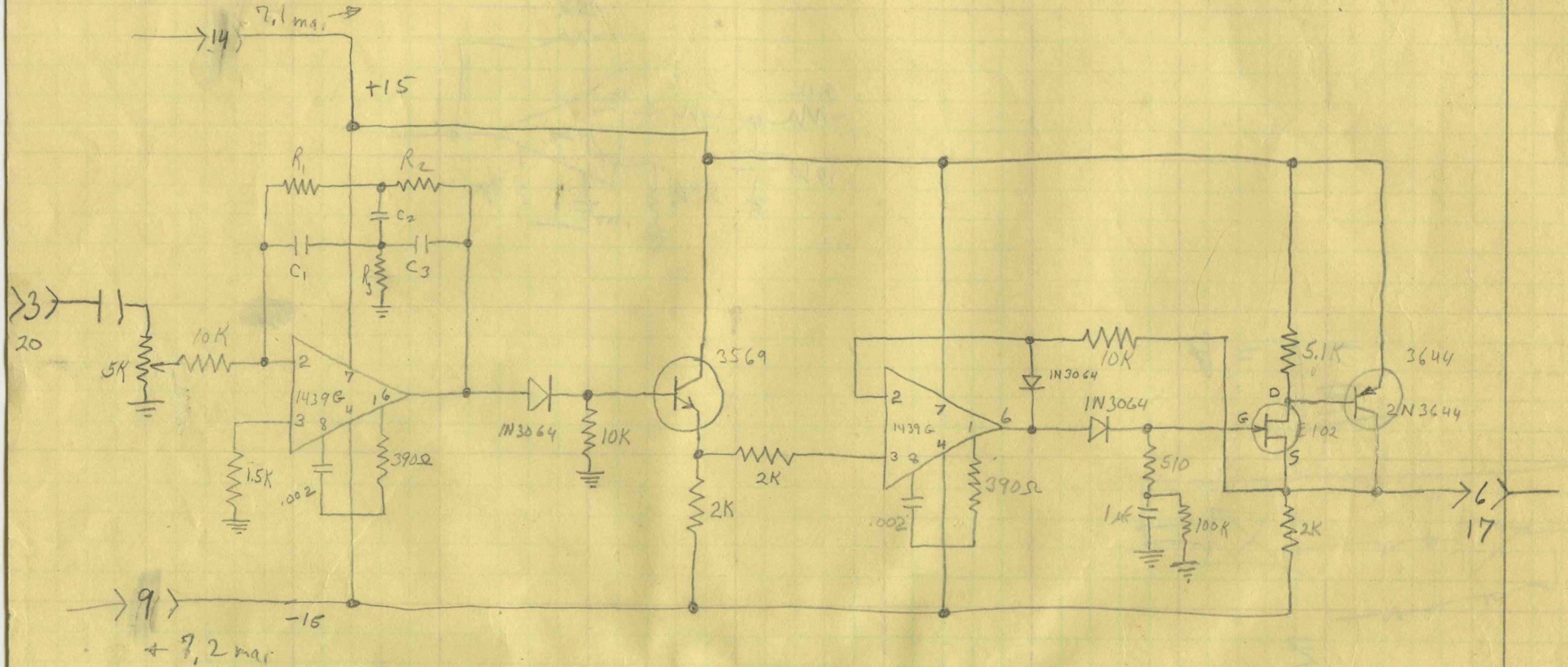
PEAK DETECTOR
XP 126



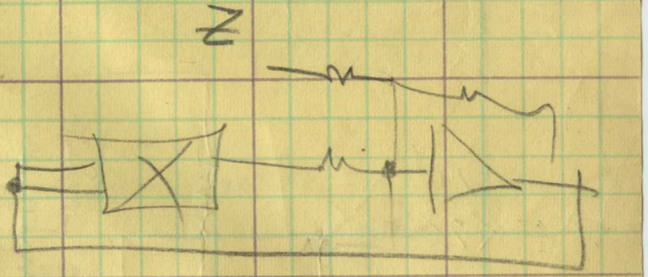
PEAK DETECTOR CONTROL LOGIC

XP127

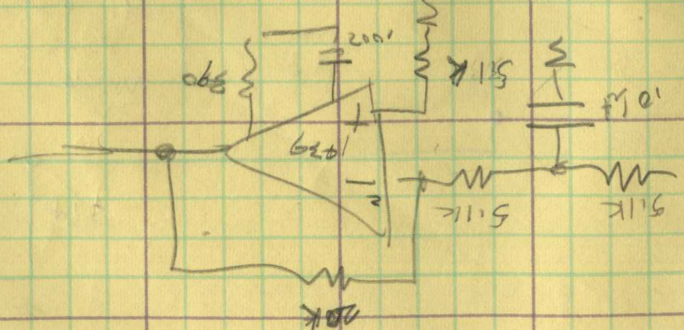
XP127

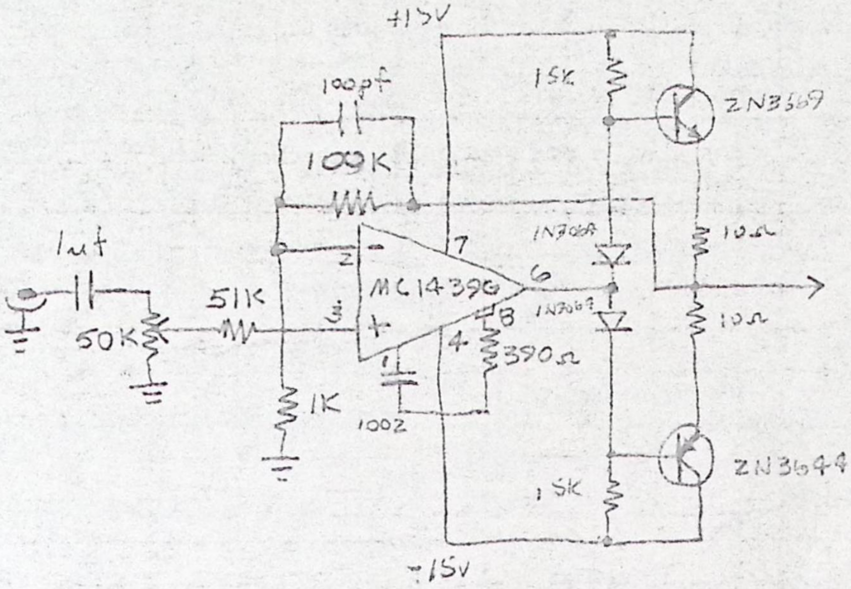


MOUTH SPECTRUM ANALYZER



$$A = \sqrt{\frac{Z}{K}}$$



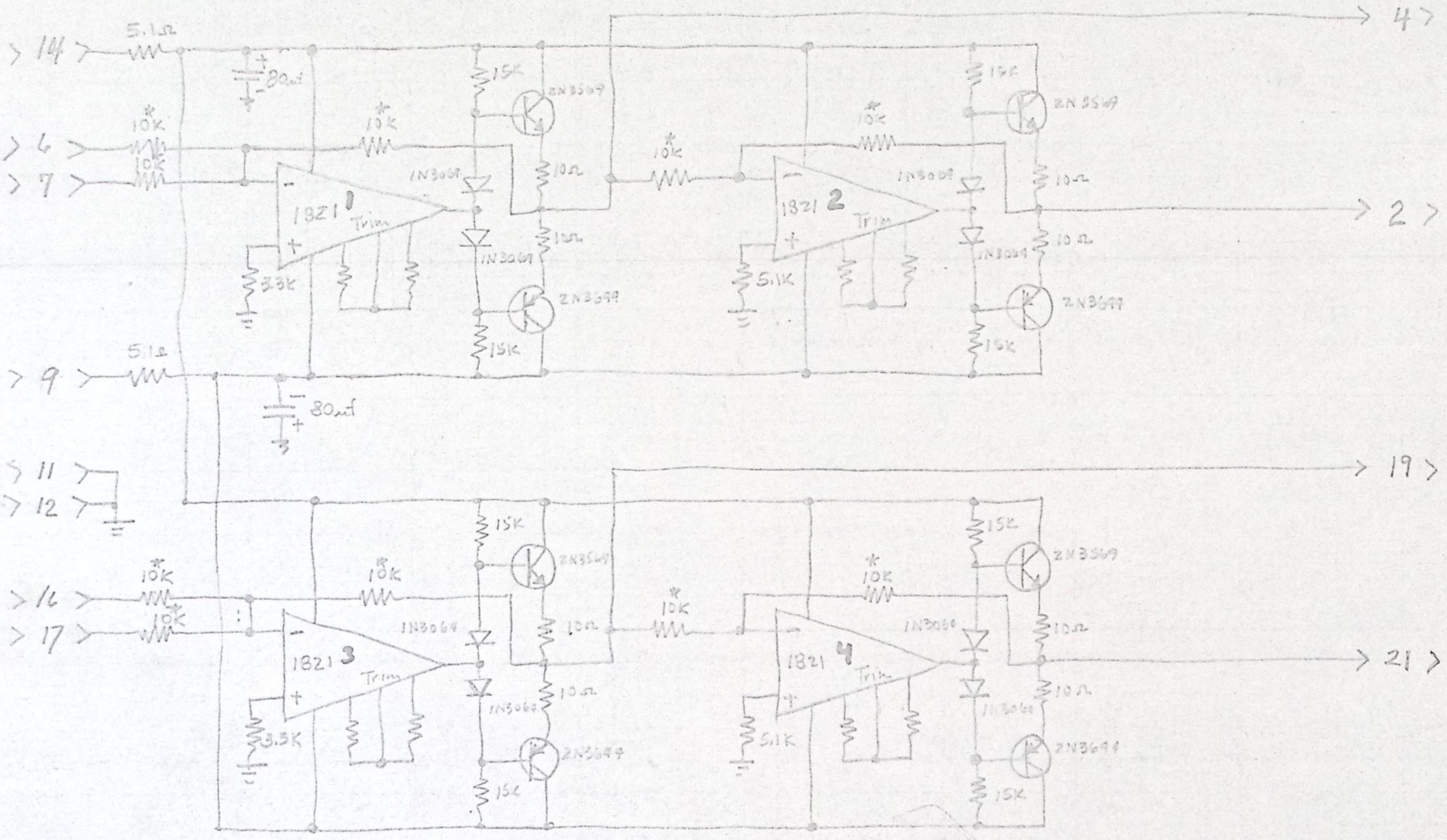


$1+\frac{R_f}{R_1'}$

Pre Amp for Lip Circuits

5/16/68

XP 128

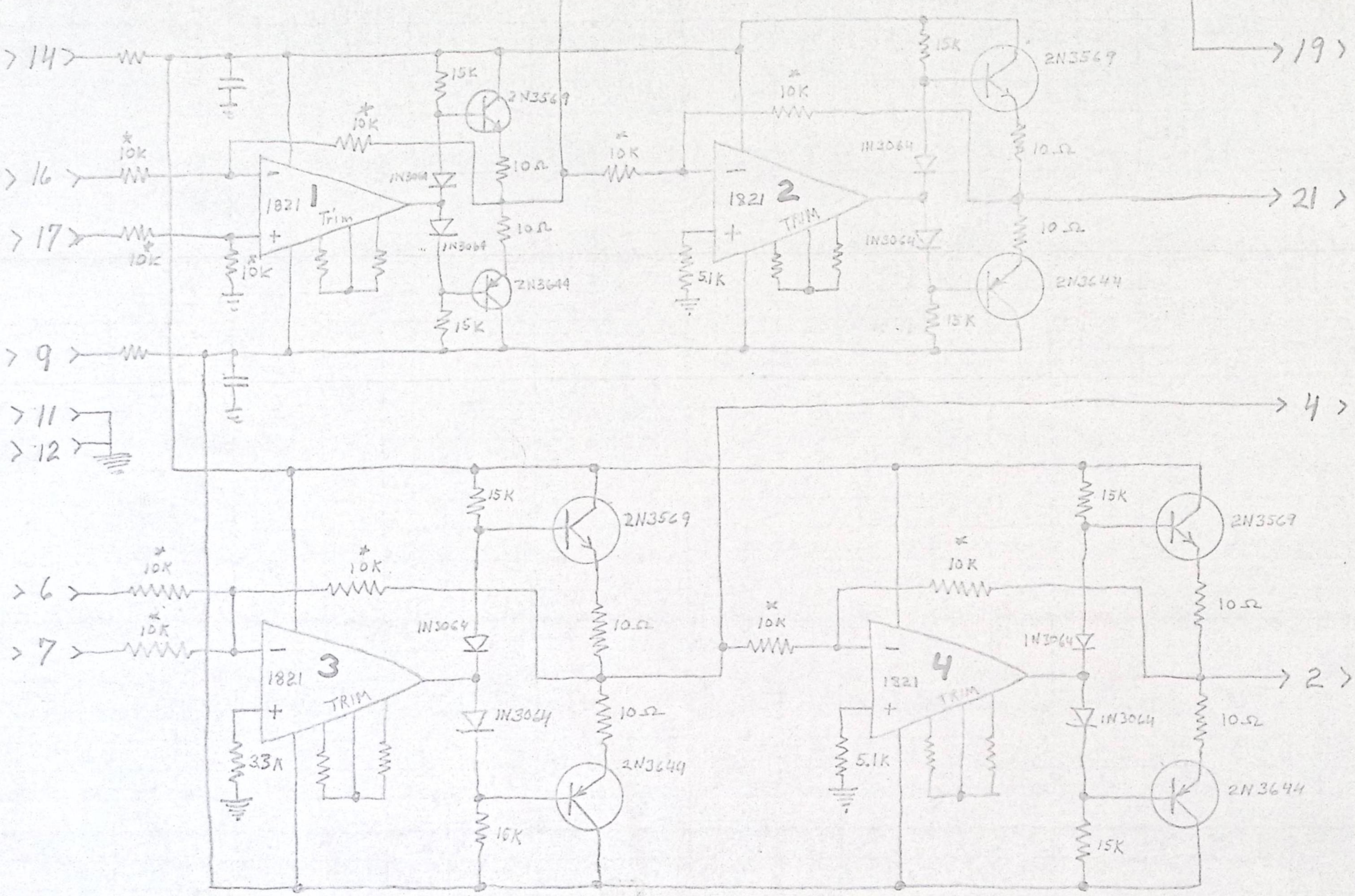


J1

Sin-Cosine Pot Rotation Network

6/11/69

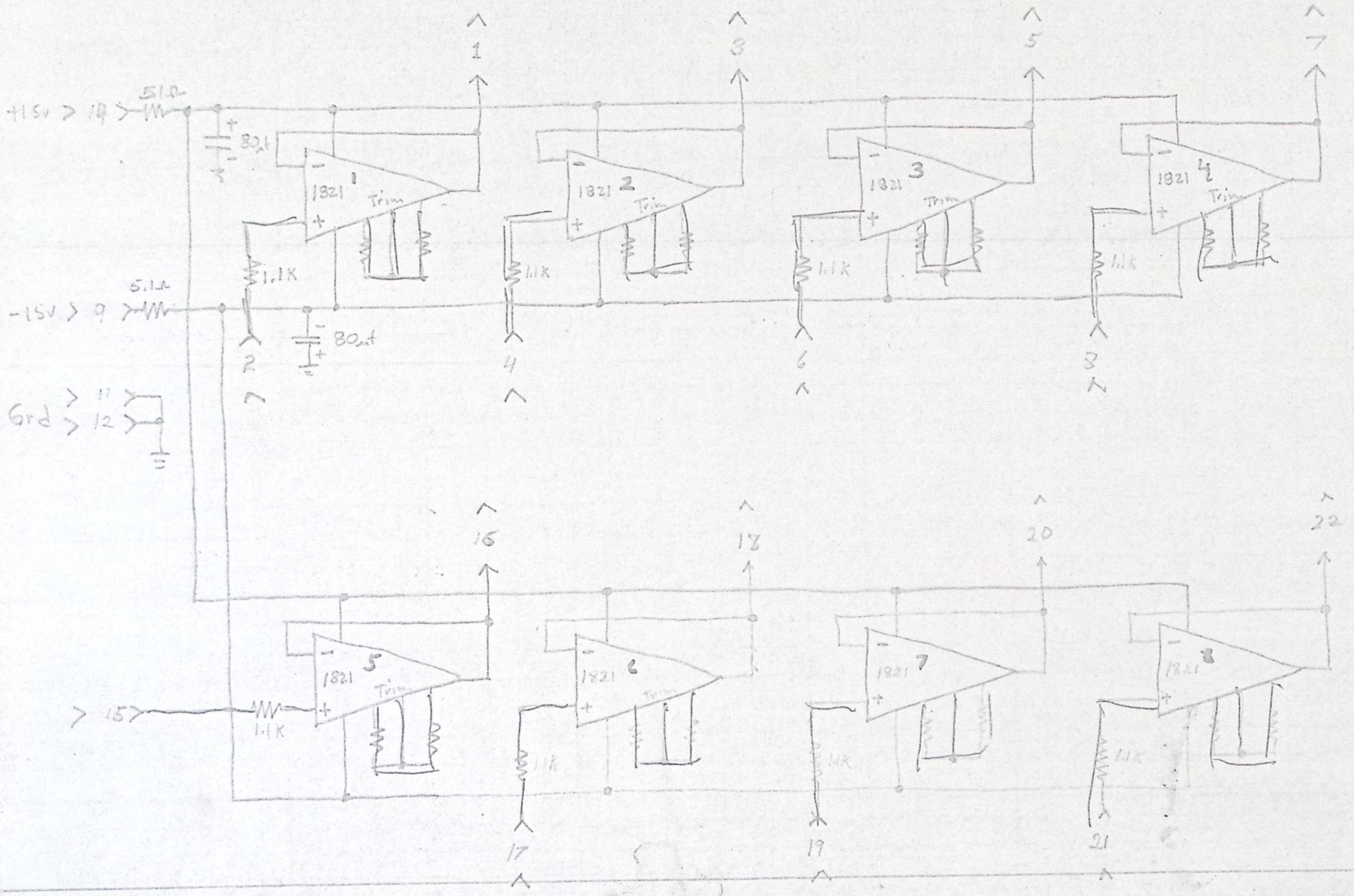
XP 131



J2

SIN-COS POT ROTATION NETWORK 6/11/69

XP132

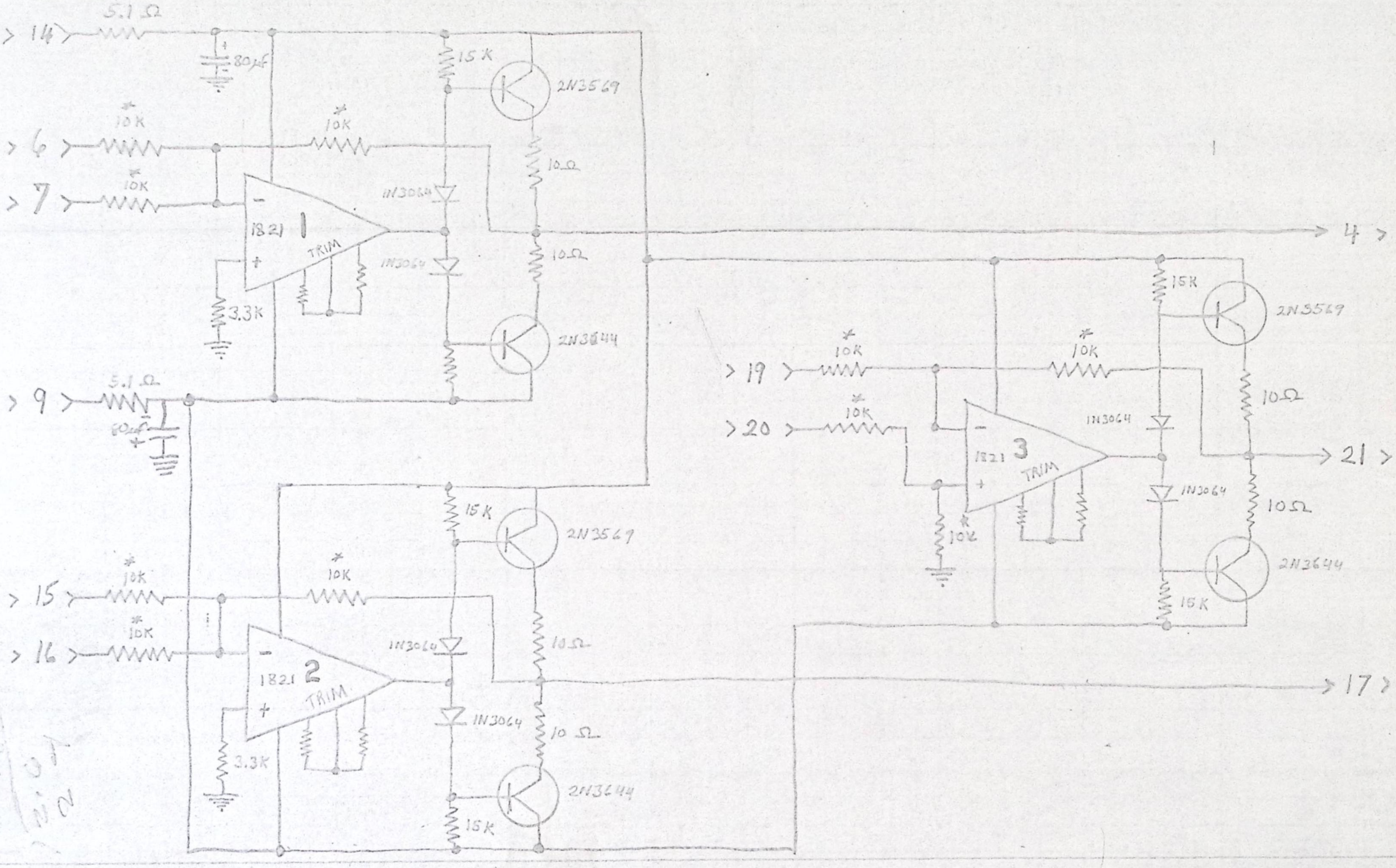


J3

SIN-COS POT ROTATION NETWORK

6-11-69

XP133

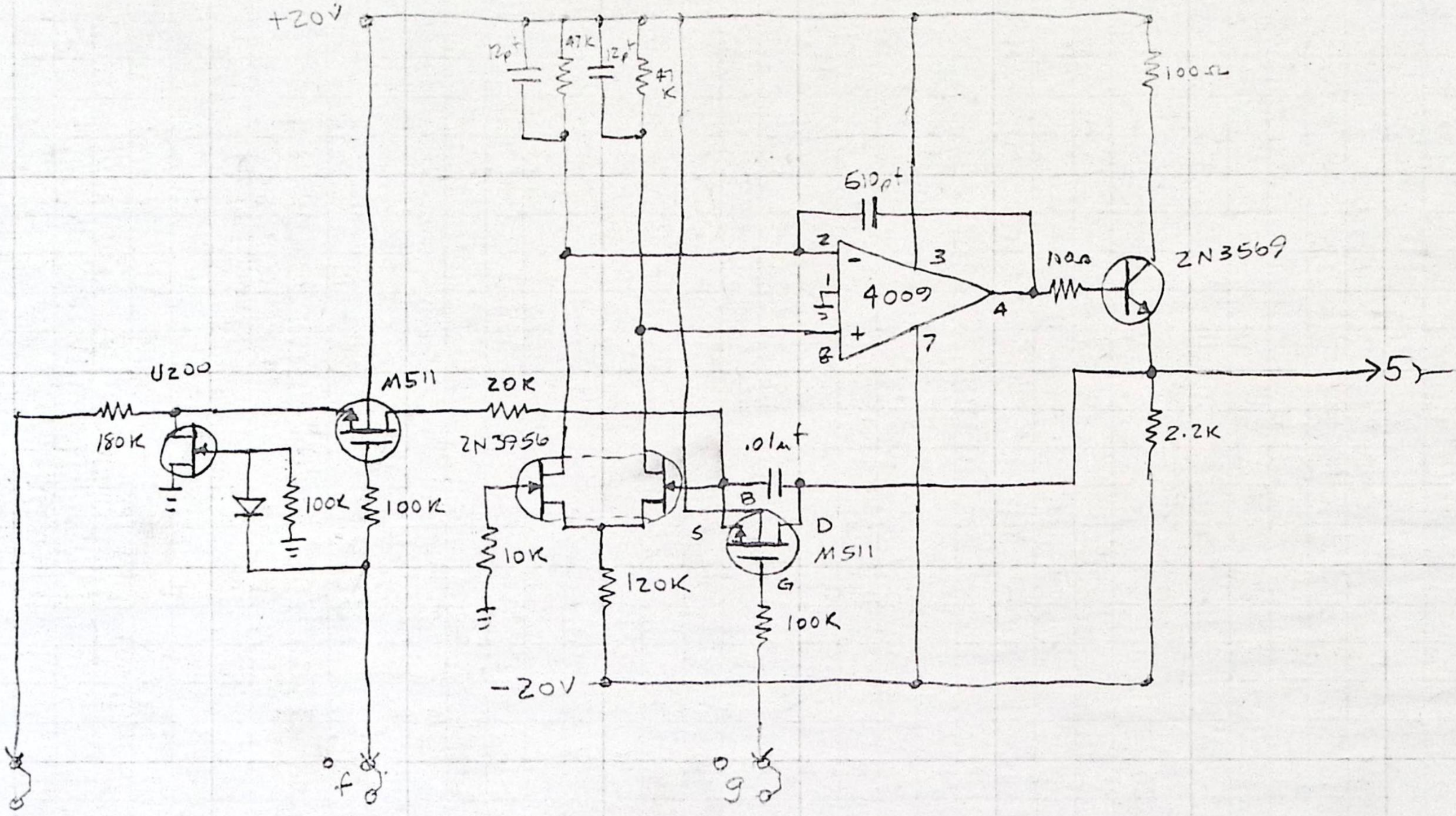


J4

SIN COS POT ROTATION NETWORK

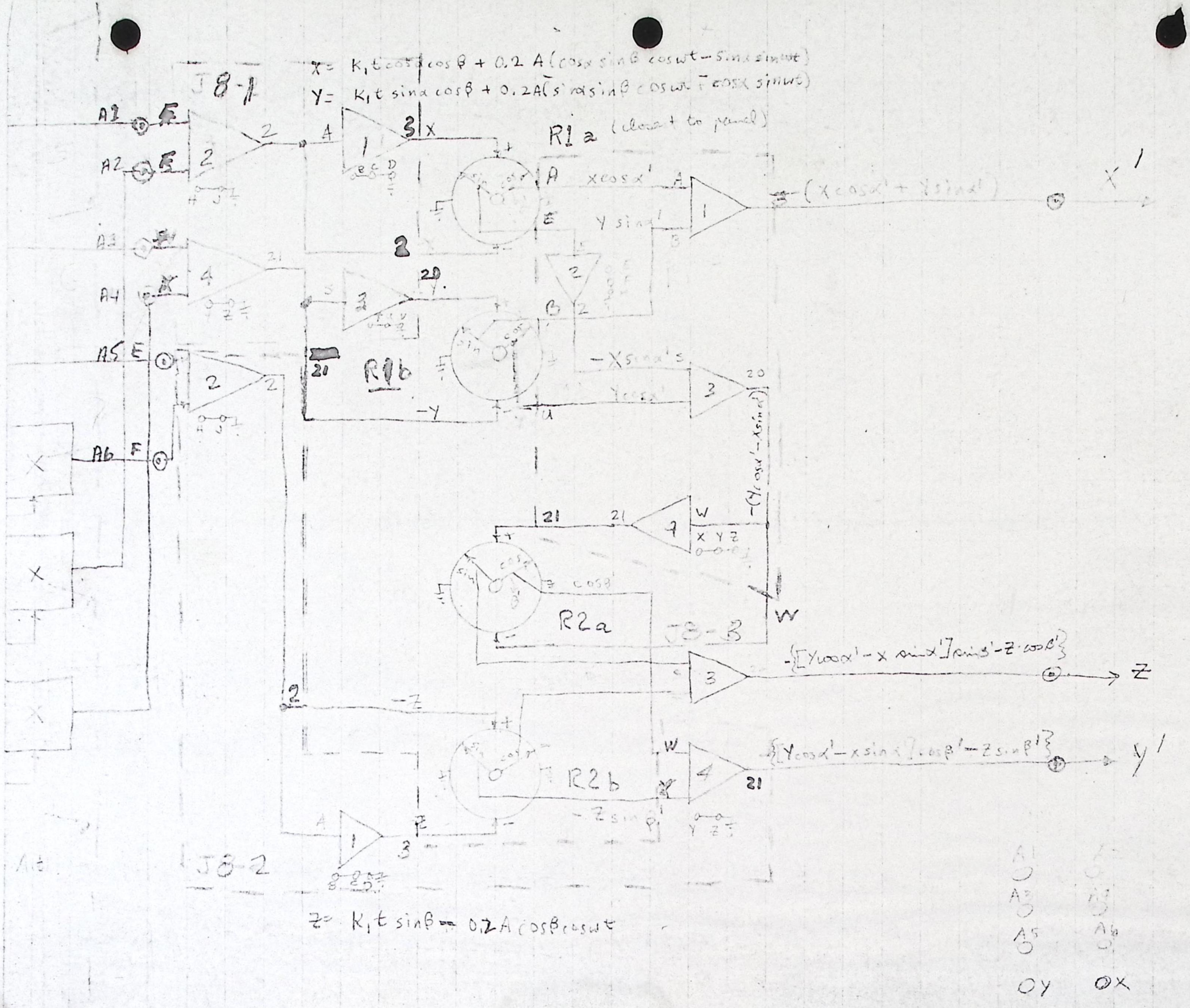
6-11-69

XP 134



DIFFERENT X INTEGRATOR

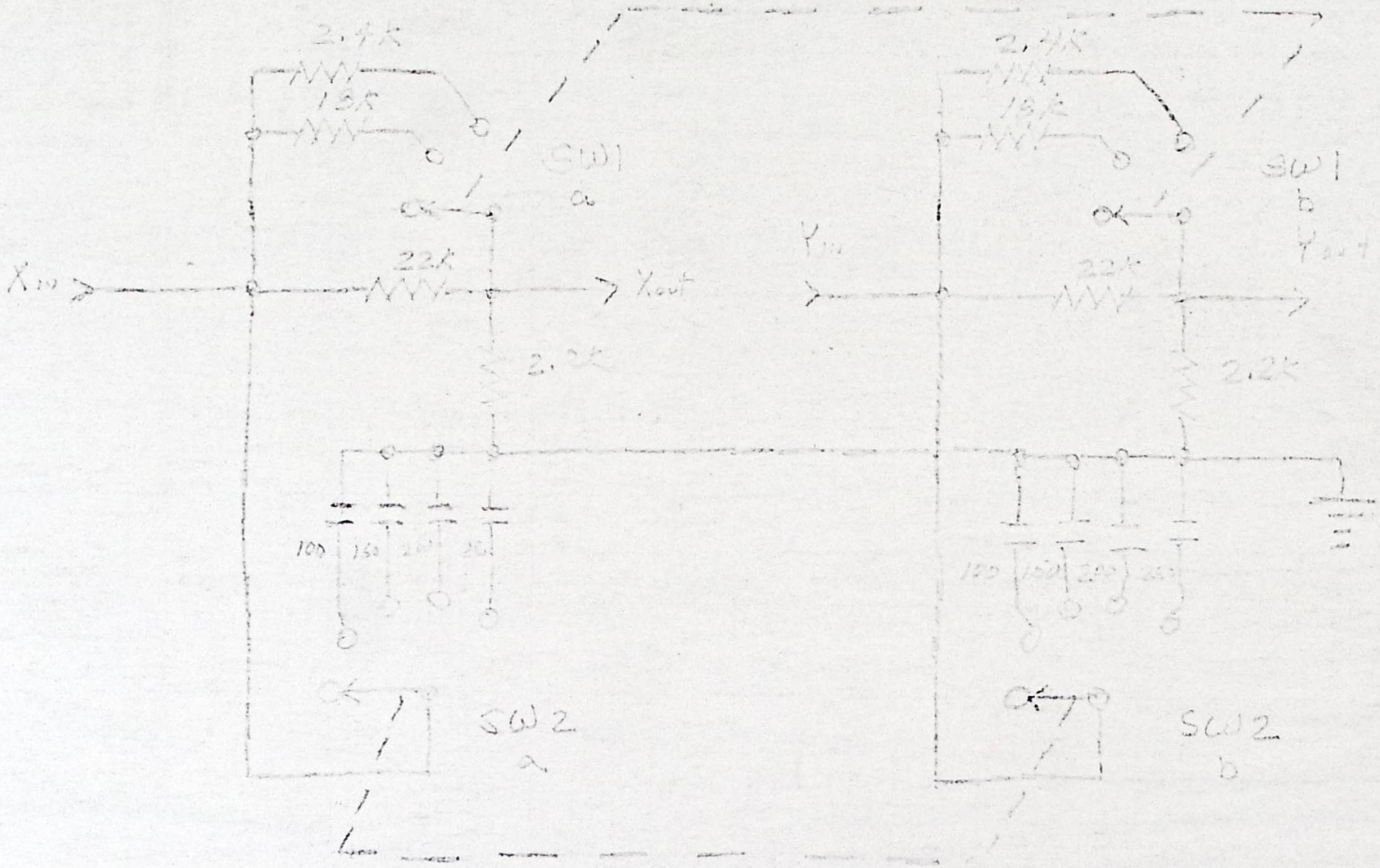
PC-10



$X = K_1 t\cos\alpha\cos\beta + 0.2A(\cos\alpha\sin\beta\cos\omega t - \sin\alpha\sin\omega t)$

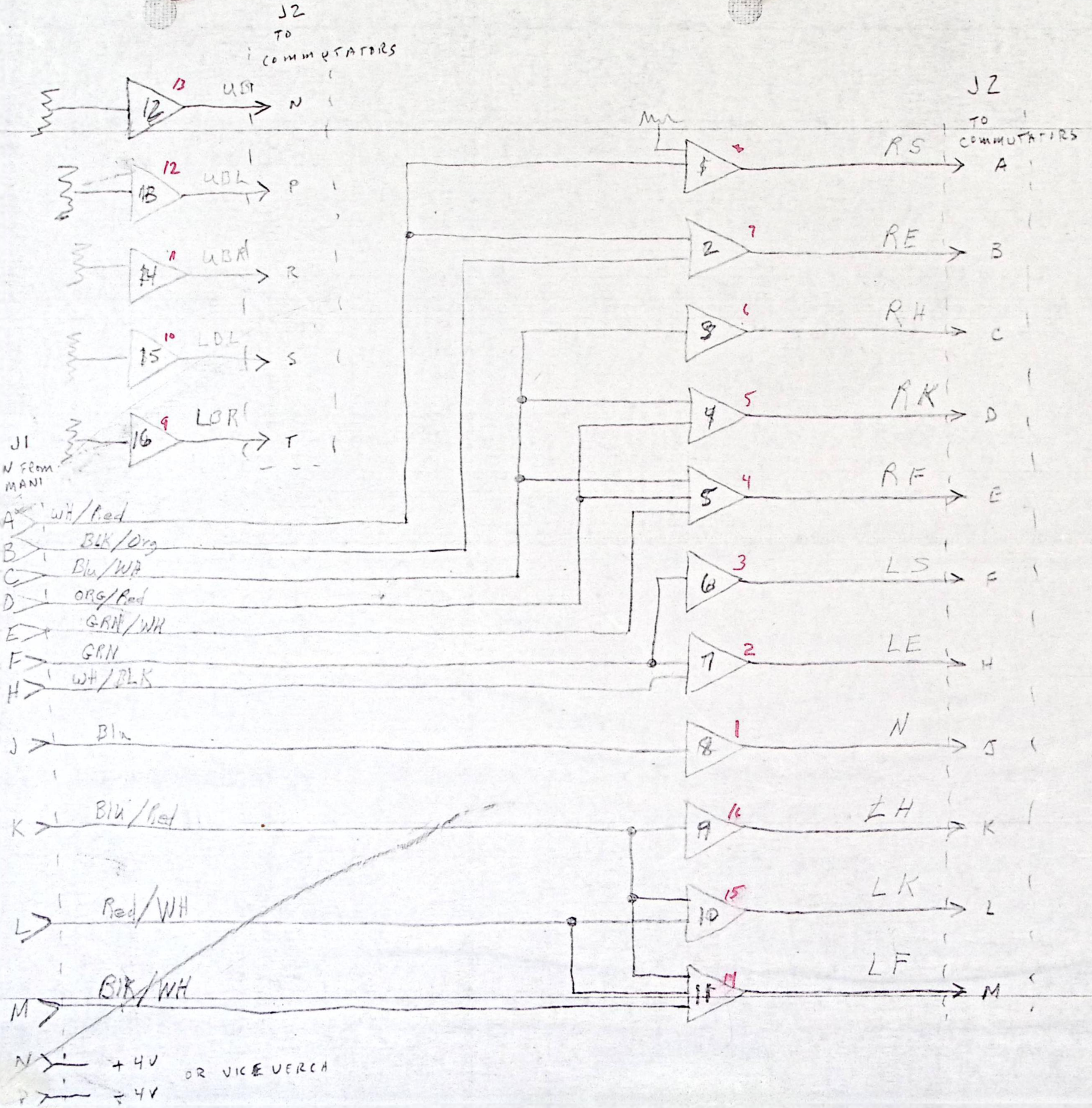
$Y = K_1 t\sin\alpha\cos\beta + 0.2A(\sin\alpha\sin\beta\cos\omega t \mp \cos\alpha\sin\omega t)$

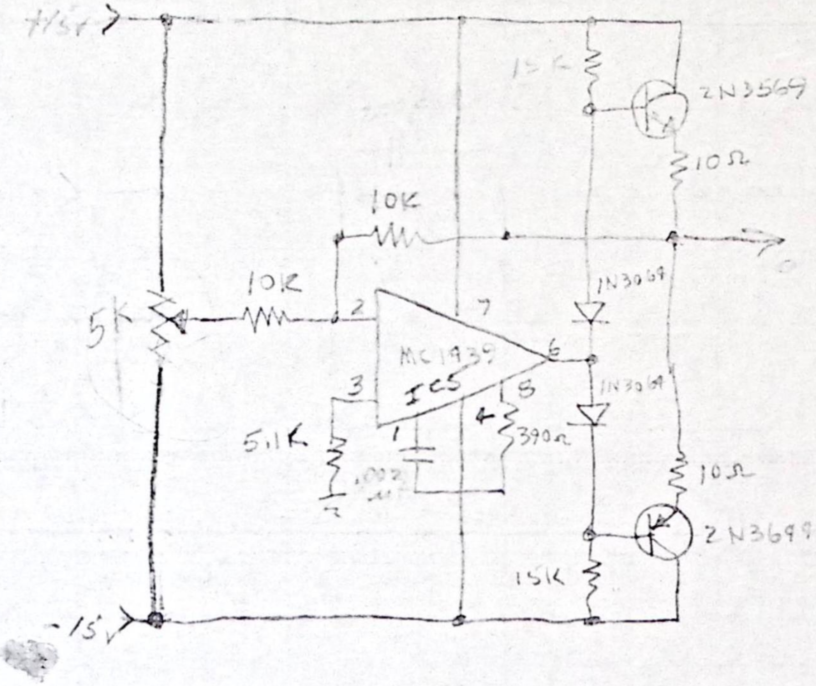
$Z = K_1 t\sin\beta - 0.2A\cos\beta\cos\omega t$



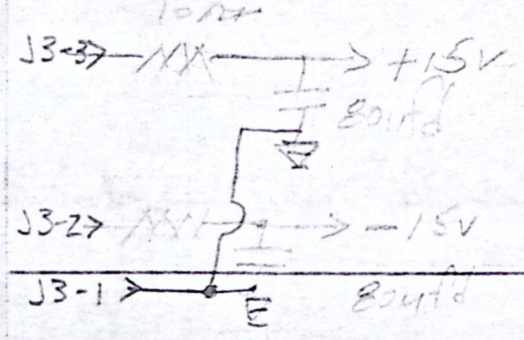
CONTROL Block

Att. Sw. Network
+
Filter Network

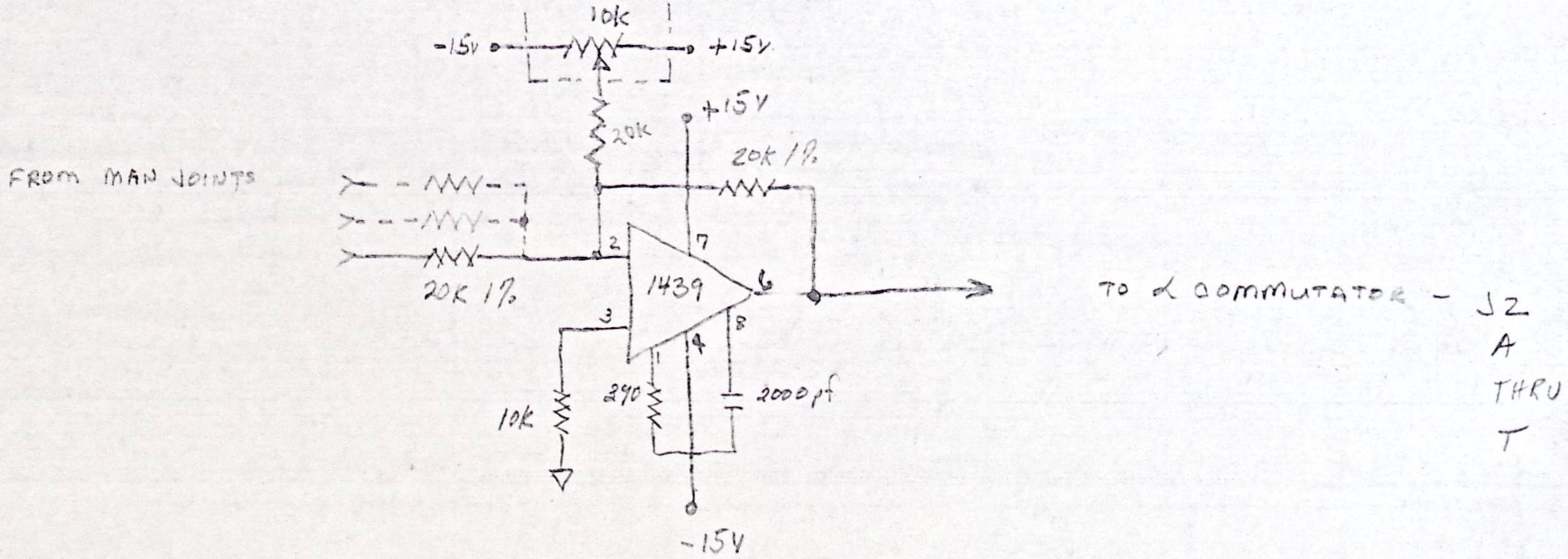

J2
TO
COMMUTATORS
12
13
UBT
N
13
12
UBL
P
14
11
UBR
R
15
10
LBL
S
16
9
LBR
T
J1
N From
MANI
J2
TO
COMMUTATORS
1
8
RS
A
2
7
RE
B
3
6
RH
C
4
5
RK
D
5
4
RF
E
6
3
LS
F
7
2
LE
H
8
1
N
J
9
16
LH
K
10
15
LK
L
11
14
LF
M
A
WH/Red
B
BLK/Org
C
Blu/WH
D
ORG/Red
E
GRN/WH
F
GRN
H
WH/BLK
J
Blu
K
Blu/Red
L
Red/WH
M
BLK/WH
N
+4V
OR VICE VERCA
-4V



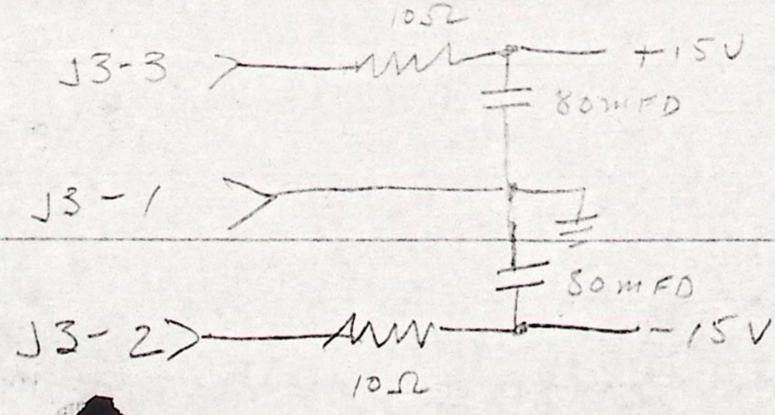
+4V
AND TO MAN ON J1-N + J1-P
-4V

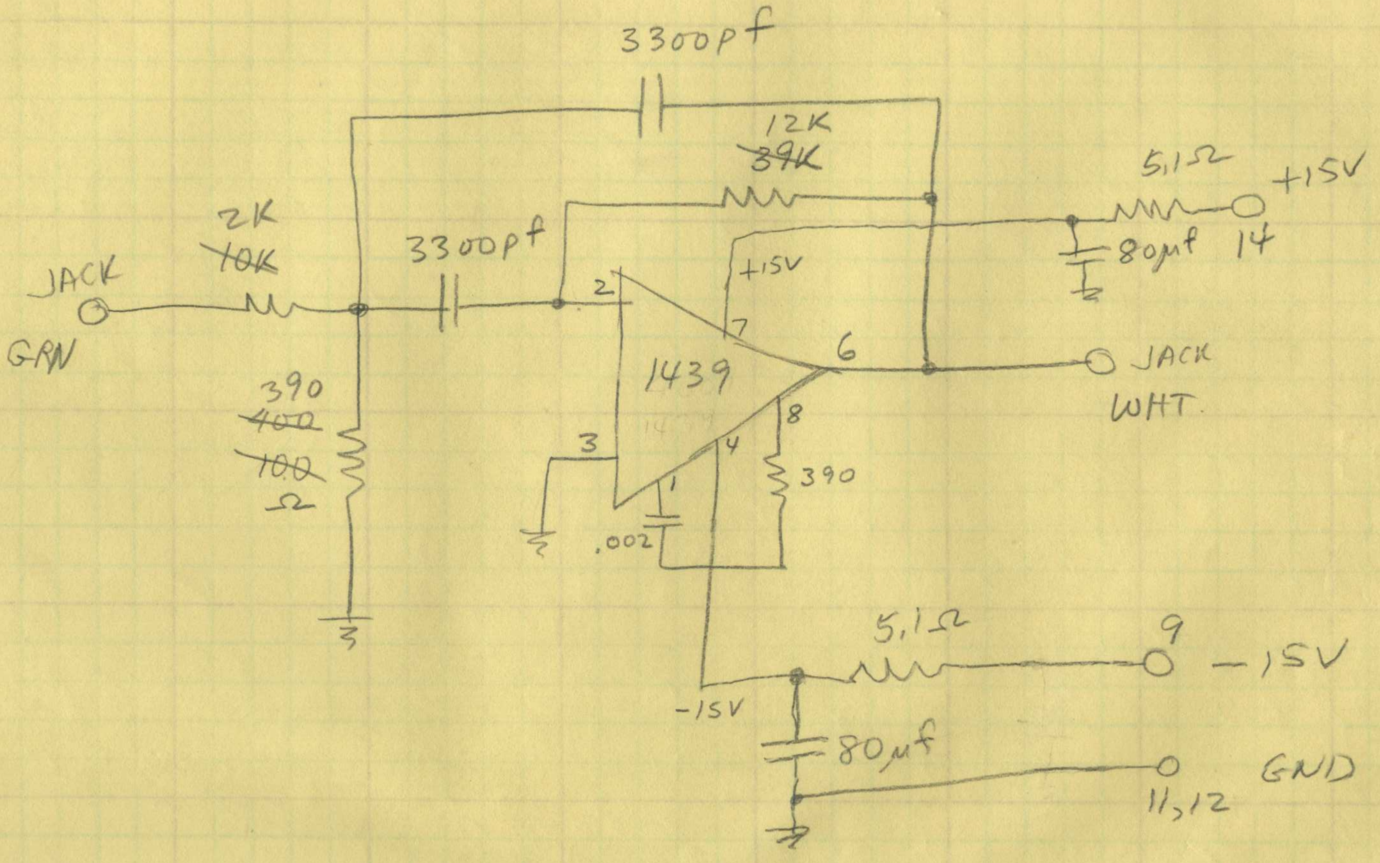


MAN HARNESS POWER DRIVER

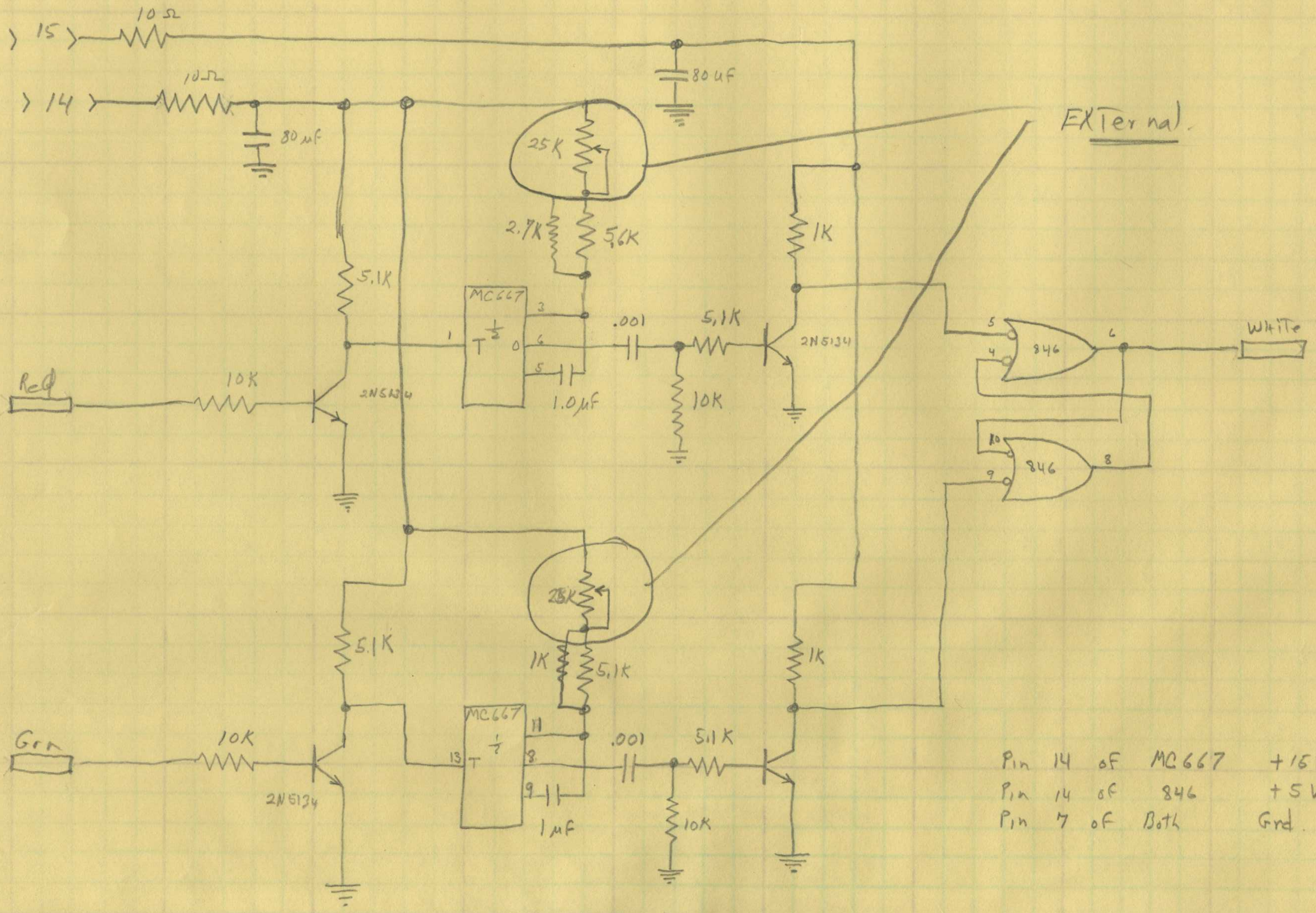


SUMMING AMPLIFIER FOR HARNESS



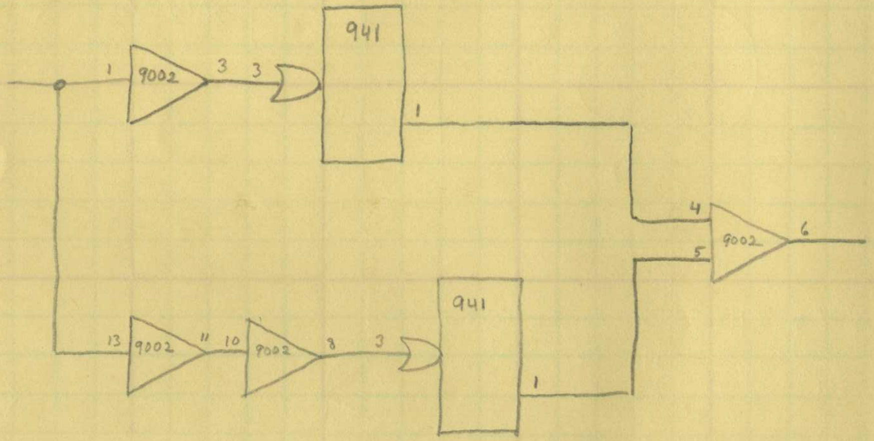


25 KHz Band Pass Filter 10-10-69



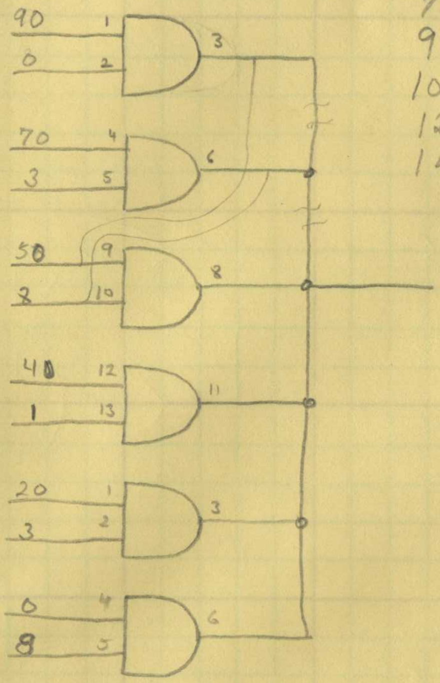
Pin 14 of MC667 +15V
Pin 14 of 846 +5V
Pin 7 of Both Grd.

Double Delay For globe. 10-17-69



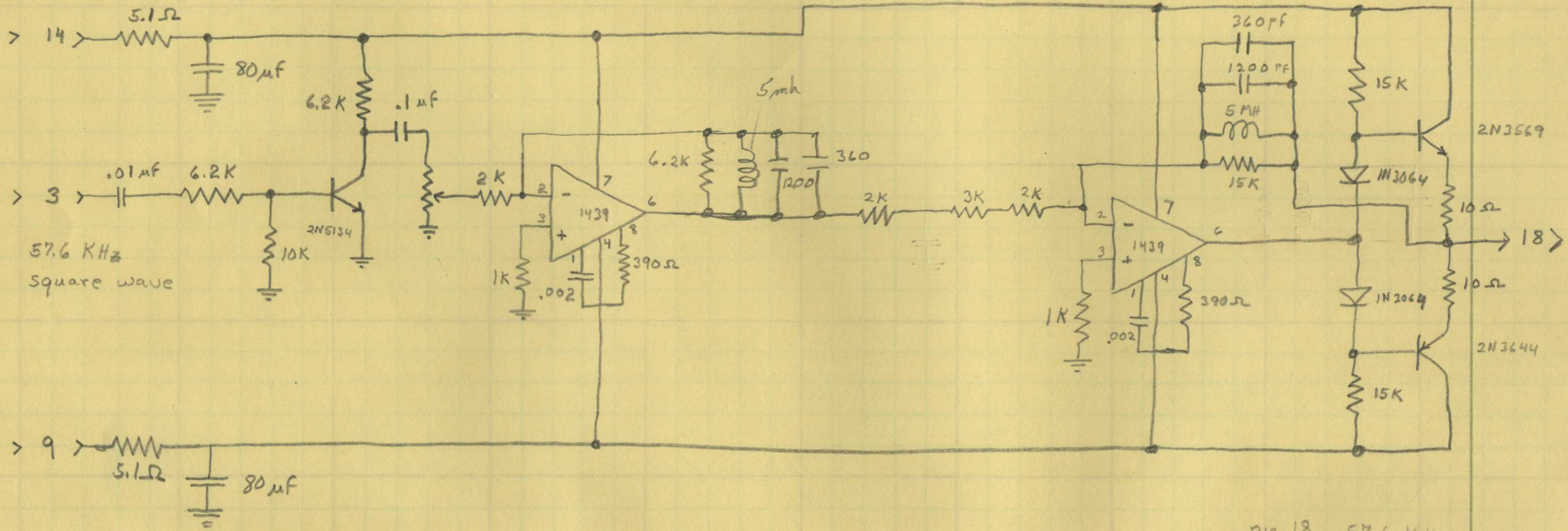
Longitude Blanking

08
23
41
58
73
90
108
123
141



Latitude sync.

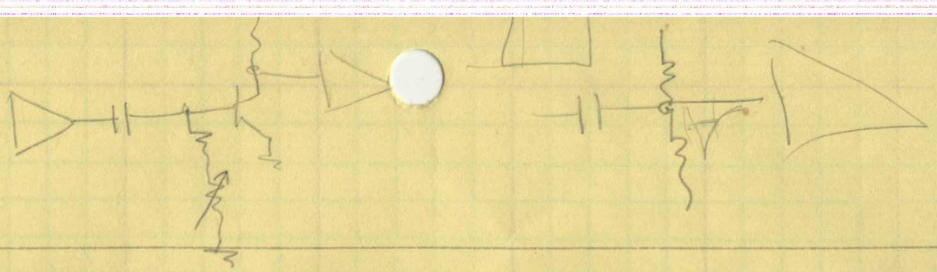
10-13-69

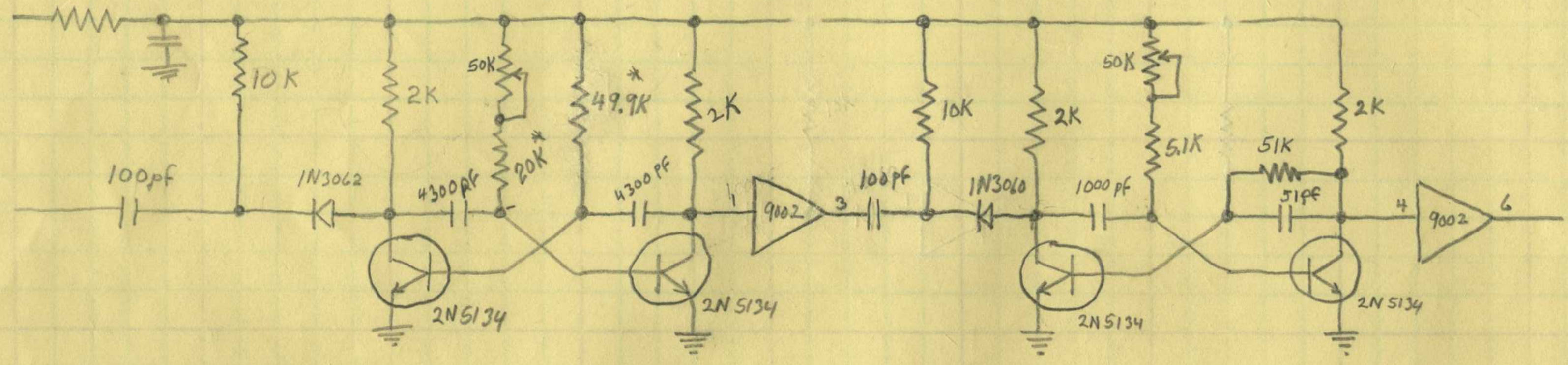


57.6 KHz
square wave

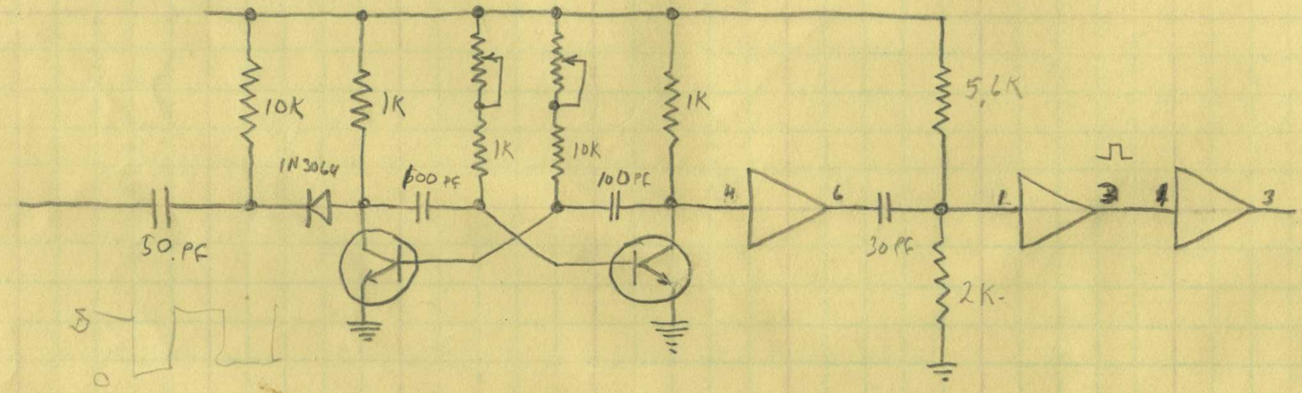
pin 18 57.6 KHz
sine wave

FILTER BOARD 10-10-69

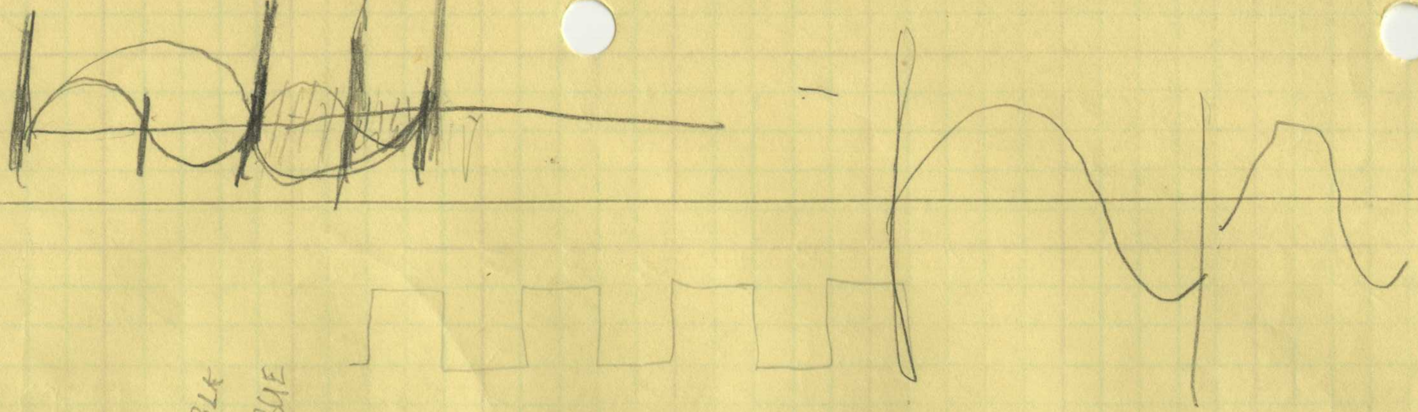


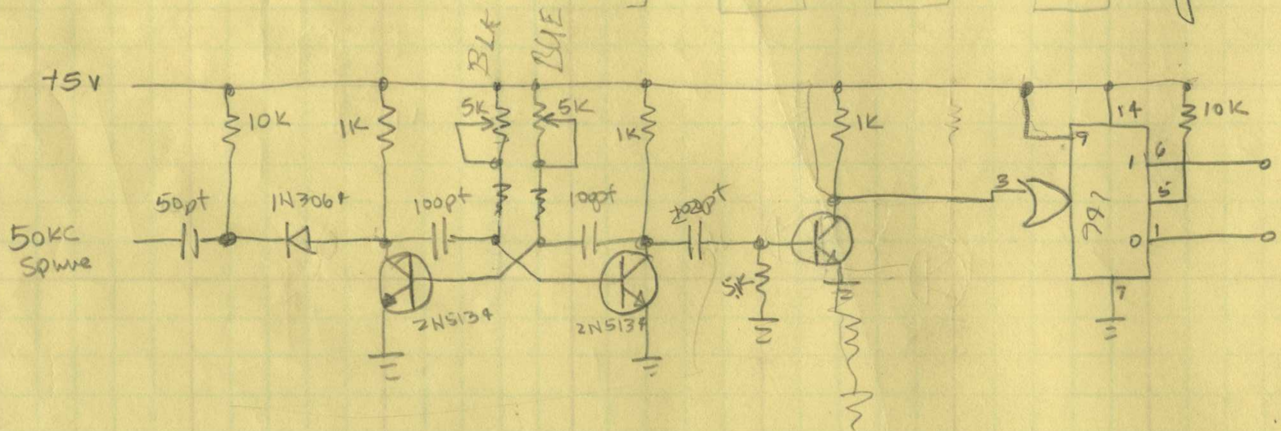


10K
2K
50K
20K*
49.9K*
2K
100pf
1N3062
4300pf
4300pf
2N5134
2N5134
1
9002
3
100pf
10K
1N3060
2K
50K
5.1K
1000 pf
51K
51pf
2K
4
9002
6
2N5134
2N5134

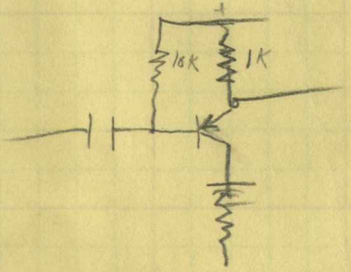


10K
1K
1K
10K
1K
5.6K
1N3064
600 pf
100 pF
50 pF
4
6
30 pF
2K
1
3
4
3
5
0

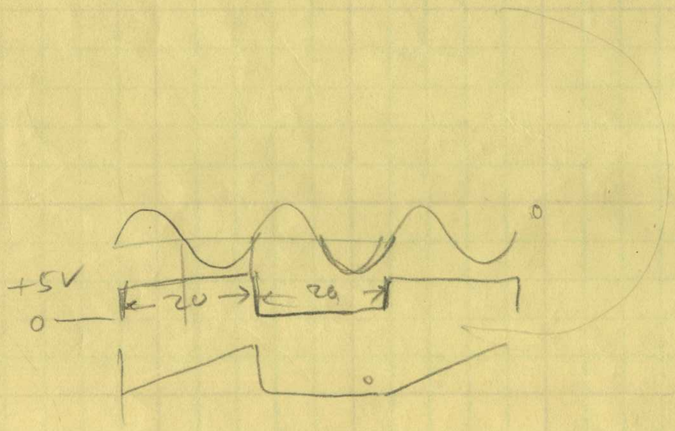




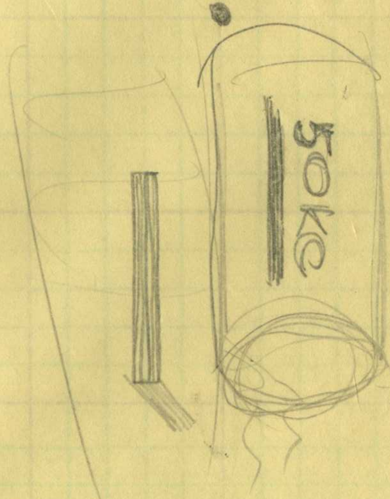
+5V
BLK
BLUE
10K
1K
5K
5K
1K
1K
14
10K
9
6
1
5
3
790
1
0
7
50pf
1N3064
100pf
100pf
100pf
50KC
Sqwve
2N5134
2N5134
5K



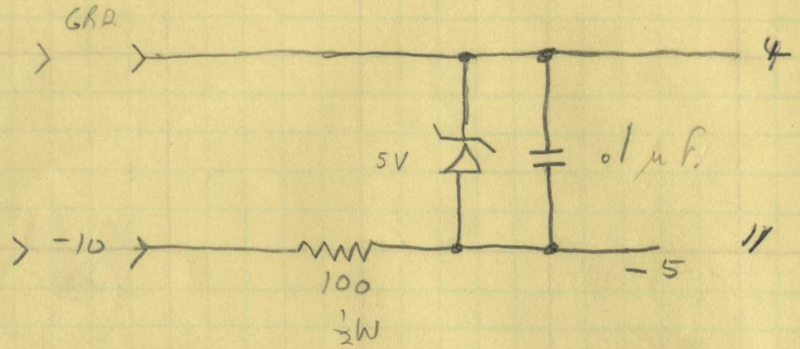
+
10K
1K

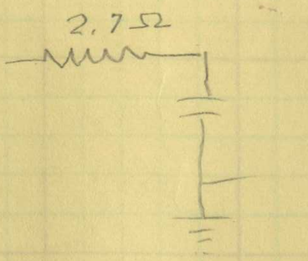


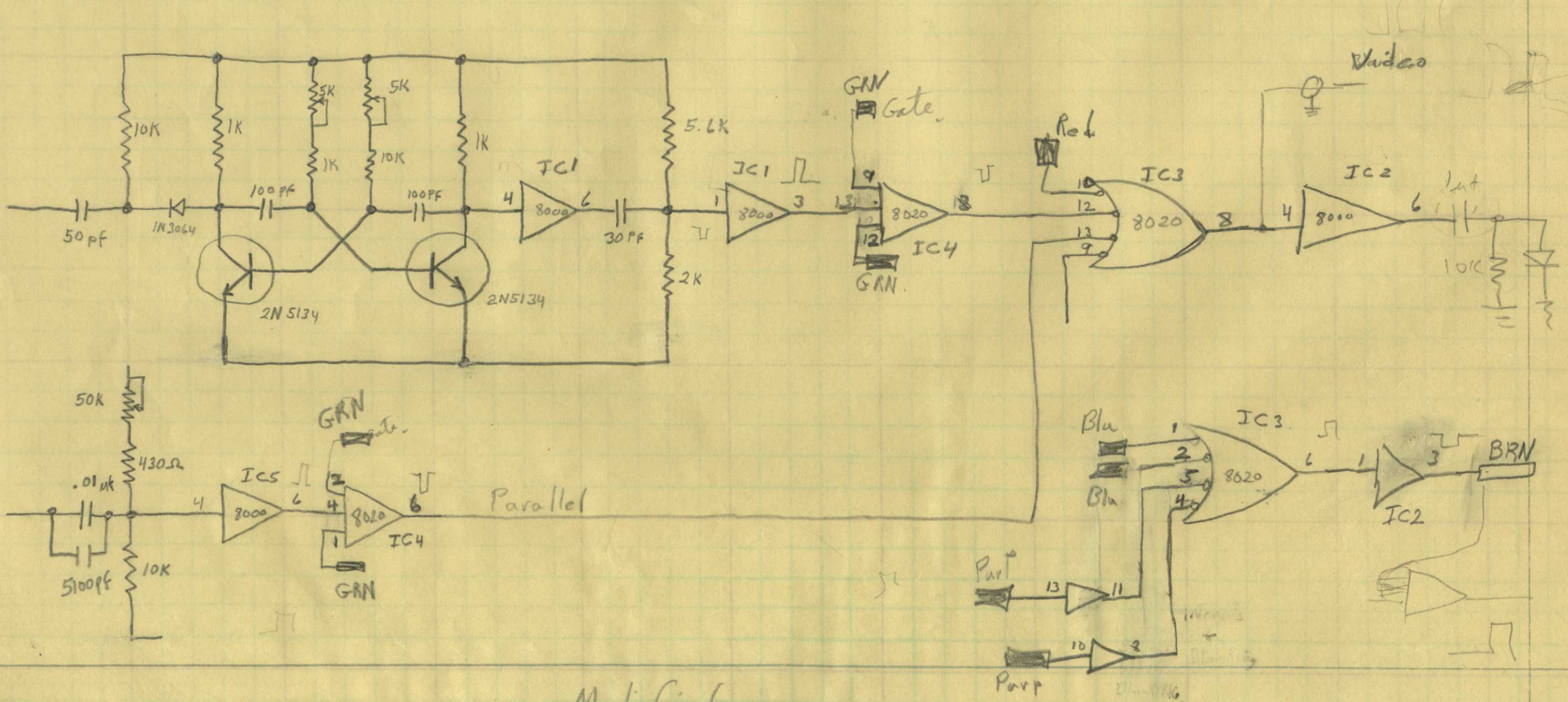
+5V
0
20
20
0



50KC



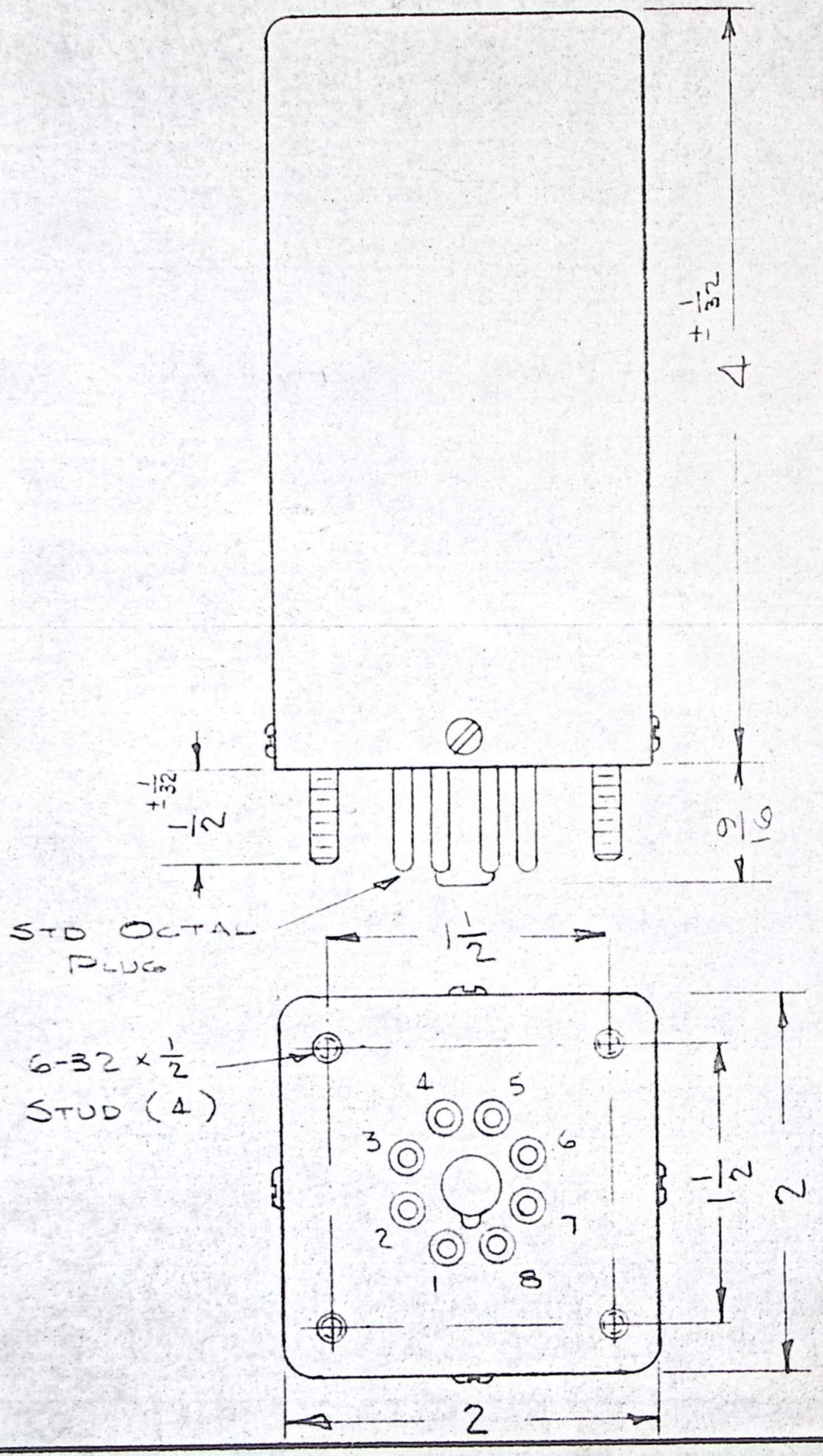


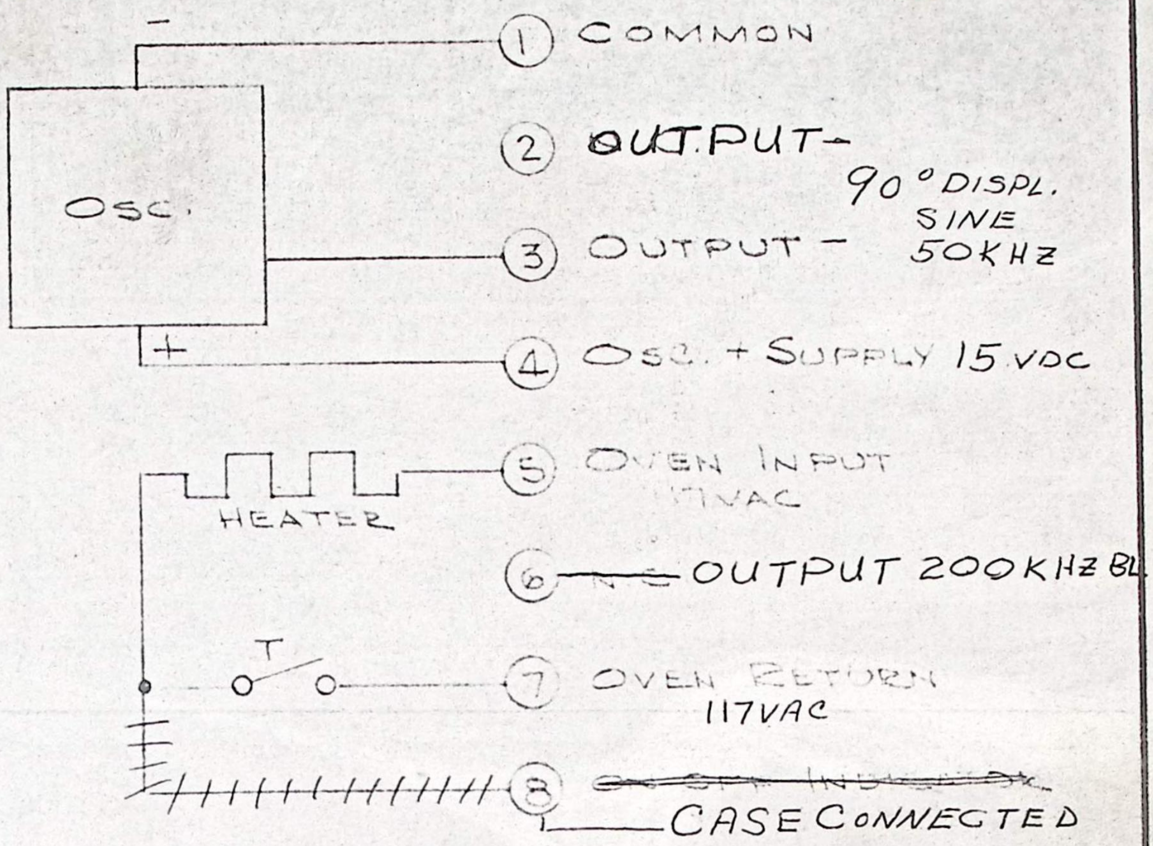


Modified

10-22-69

32 039





NOTES:

1. DIM. TOL. ± 1/64 UNLESS OTHERWISE SPECIFIED.
2. REMOVE OVEN COVER FOR ACCESS TO FREQUENCY TRIM CONTROL.

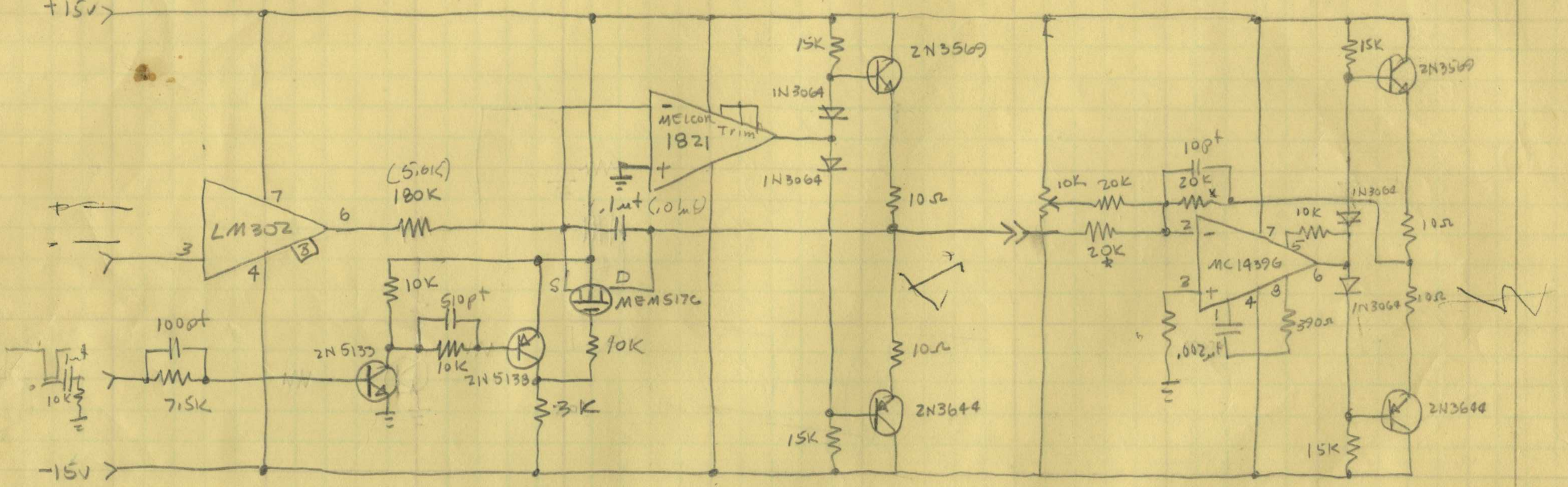
695AP

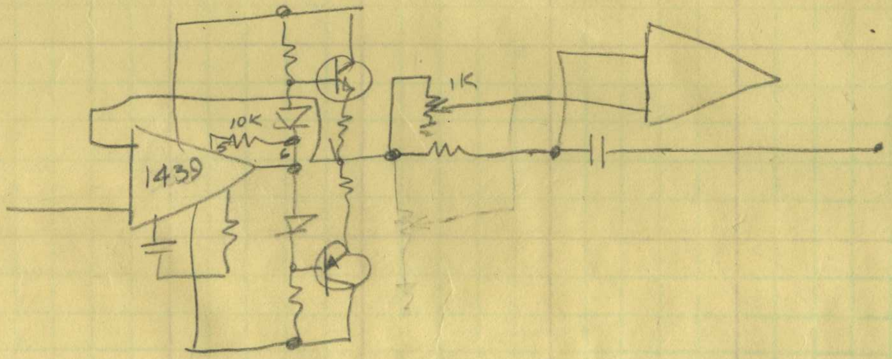
FORK STANDARDS, INC.
WEST CHICAGO, ILLINOIS

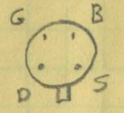
SCALE: FULL
DATE: 8-20-68
APPROVED BY:
DRAWN BY RED
REVISED

OUTLINE & TERM. CONNECTIONS

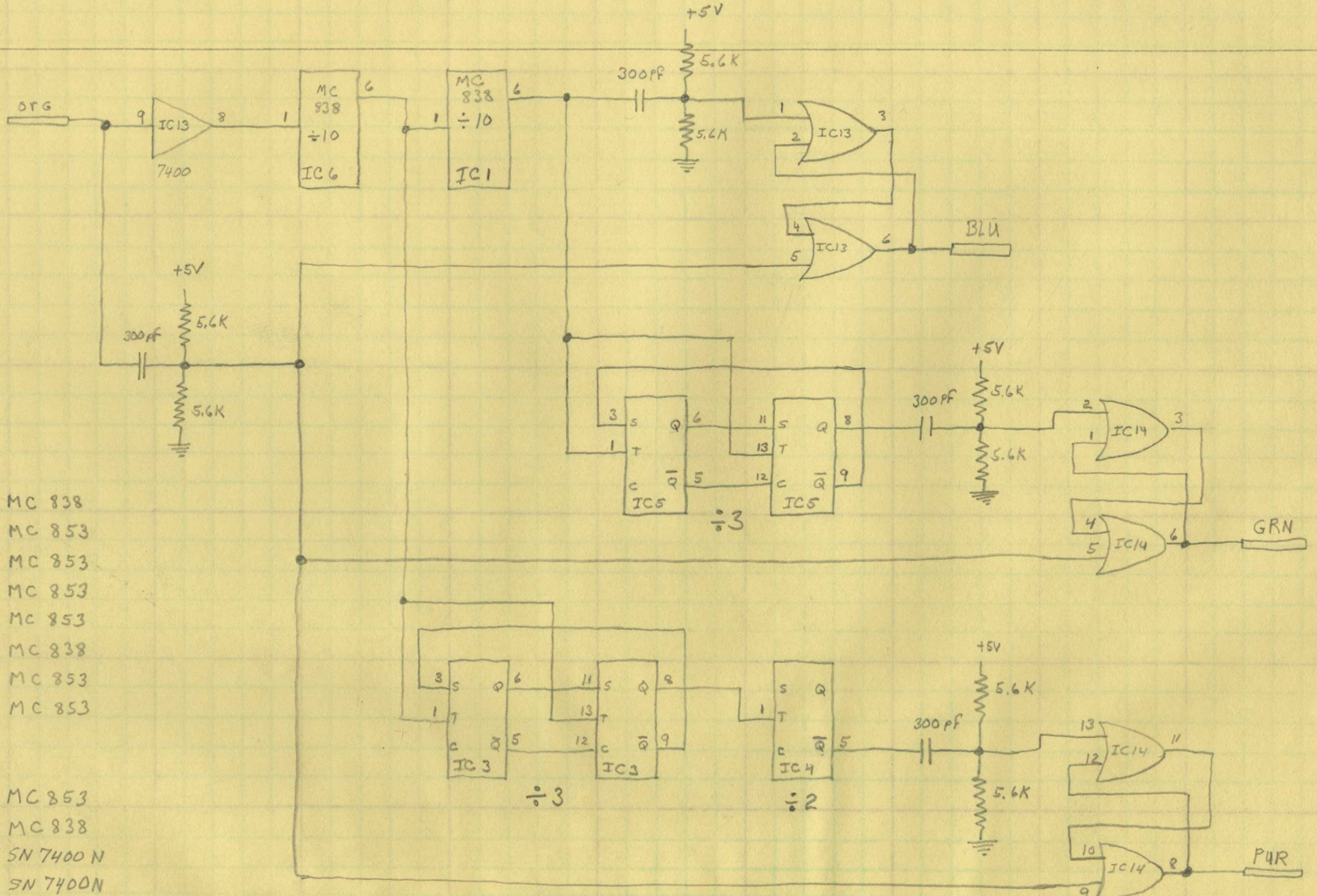
DRAWING NUMBER
32A039







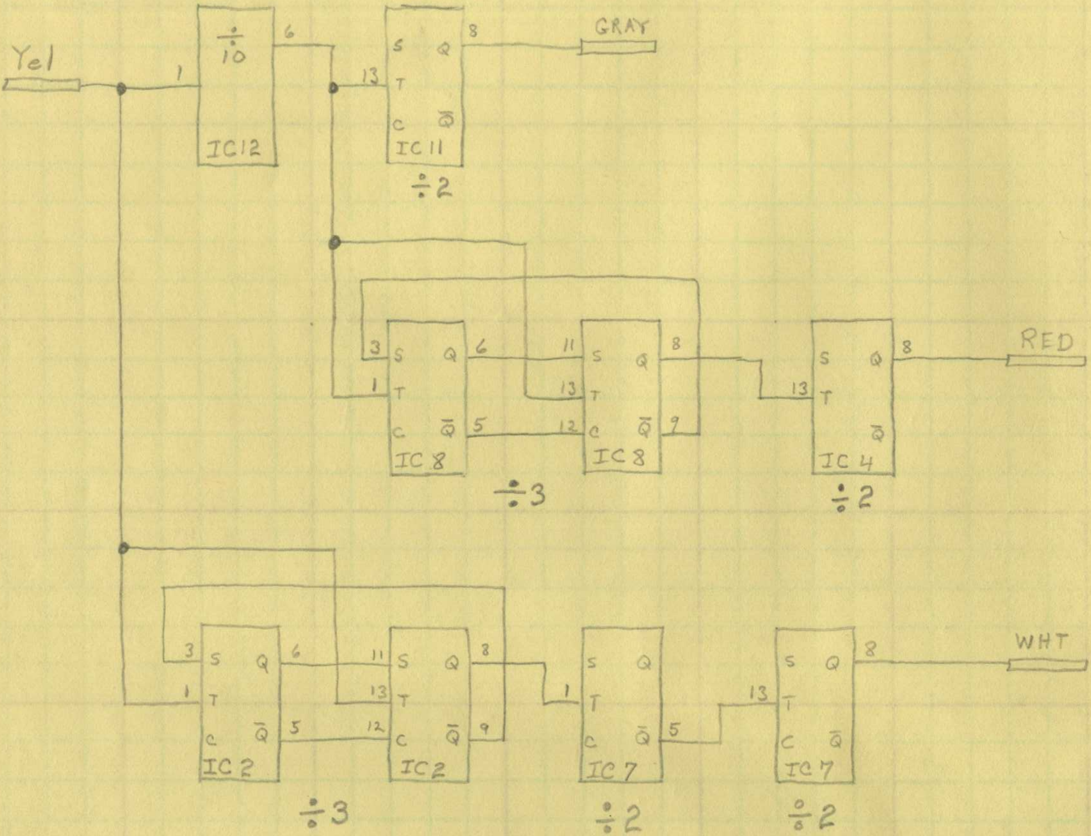
RAMP with Broken Board



IC1	MC 838
IC2	MC 853
IC3	MC 853
IC4	MC 853
IC5	MC 853
IC6	MC 838
IC7	MC 853
IC8	MC 853
IC9	
IC10	
IC11	MC 853
IC12	MC 838
IC13	SN 7400 N
IC14	SN 7400 N
IC15	
IC16	

DIVIDER BOARD PART I

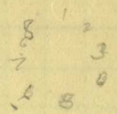
12 - 15 - 69



IC1 – MC 838
IC2 – MC 853
IC3 – MC 853
IC4 – MC 853
IC5 – MC 853
IC6 – MC 838
IC7 – MC 853
IC8 – MC 853
IC9 –
IC10 –
IC11 – MC 853
IC12 – MC 838
IC13 – SN 7400 N
IC14 – SN 7400 N
IC15 –
IC16 –

DIVIDER BOARD PART II

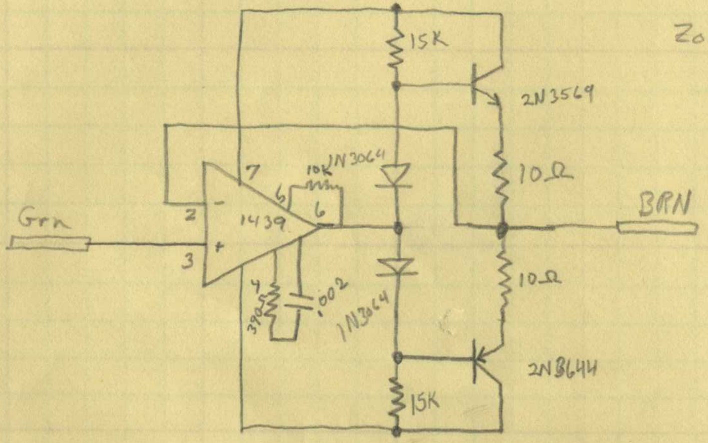
12-15-69



Voltage Follower

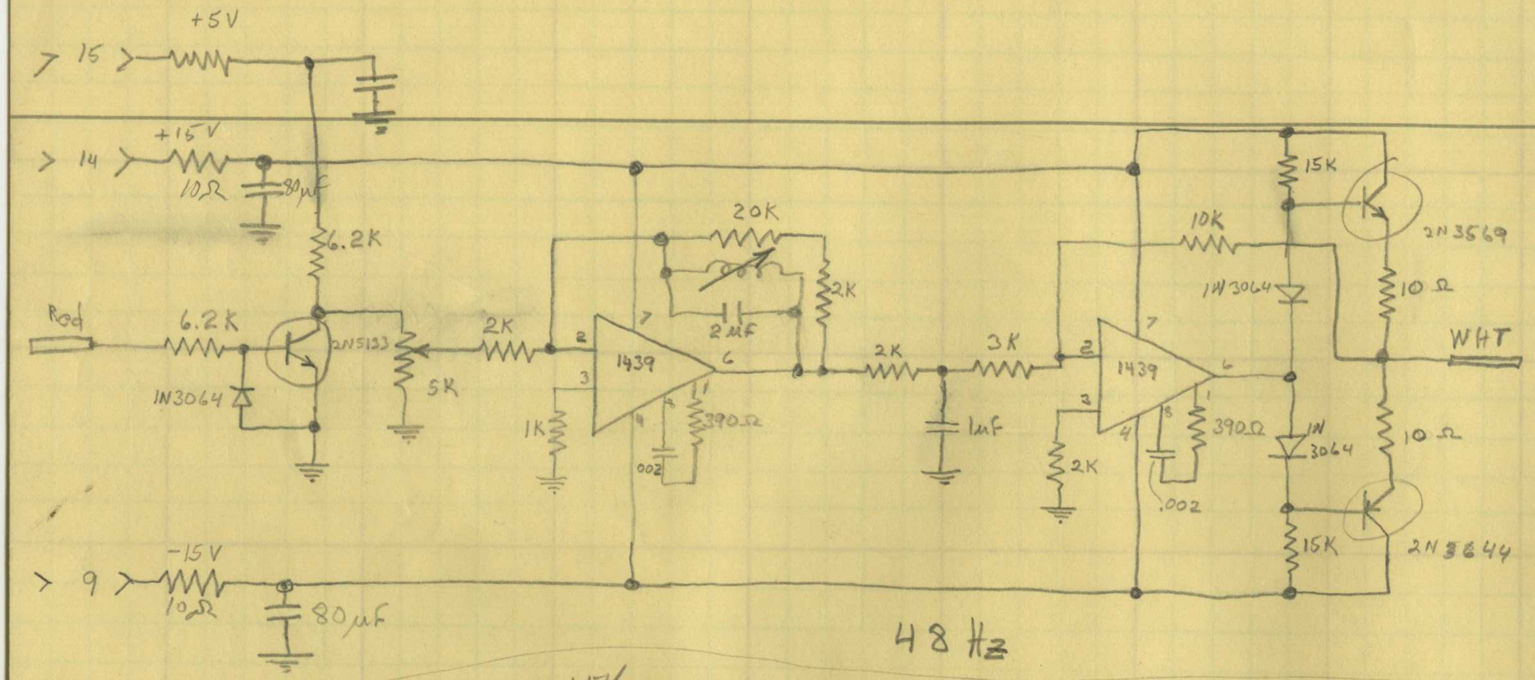
$Z_{in} > 40M$.

Zout .04 Ω



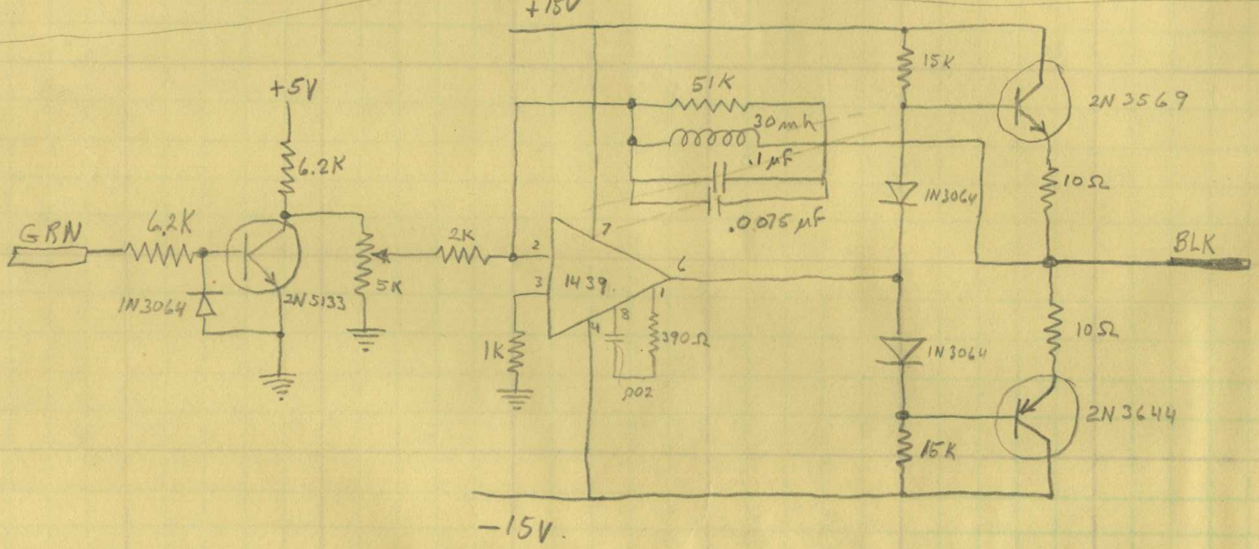
4 on board.

Voltage Follower 10-10-69



48 Hz

Globe Freq.

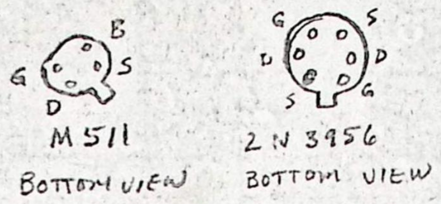


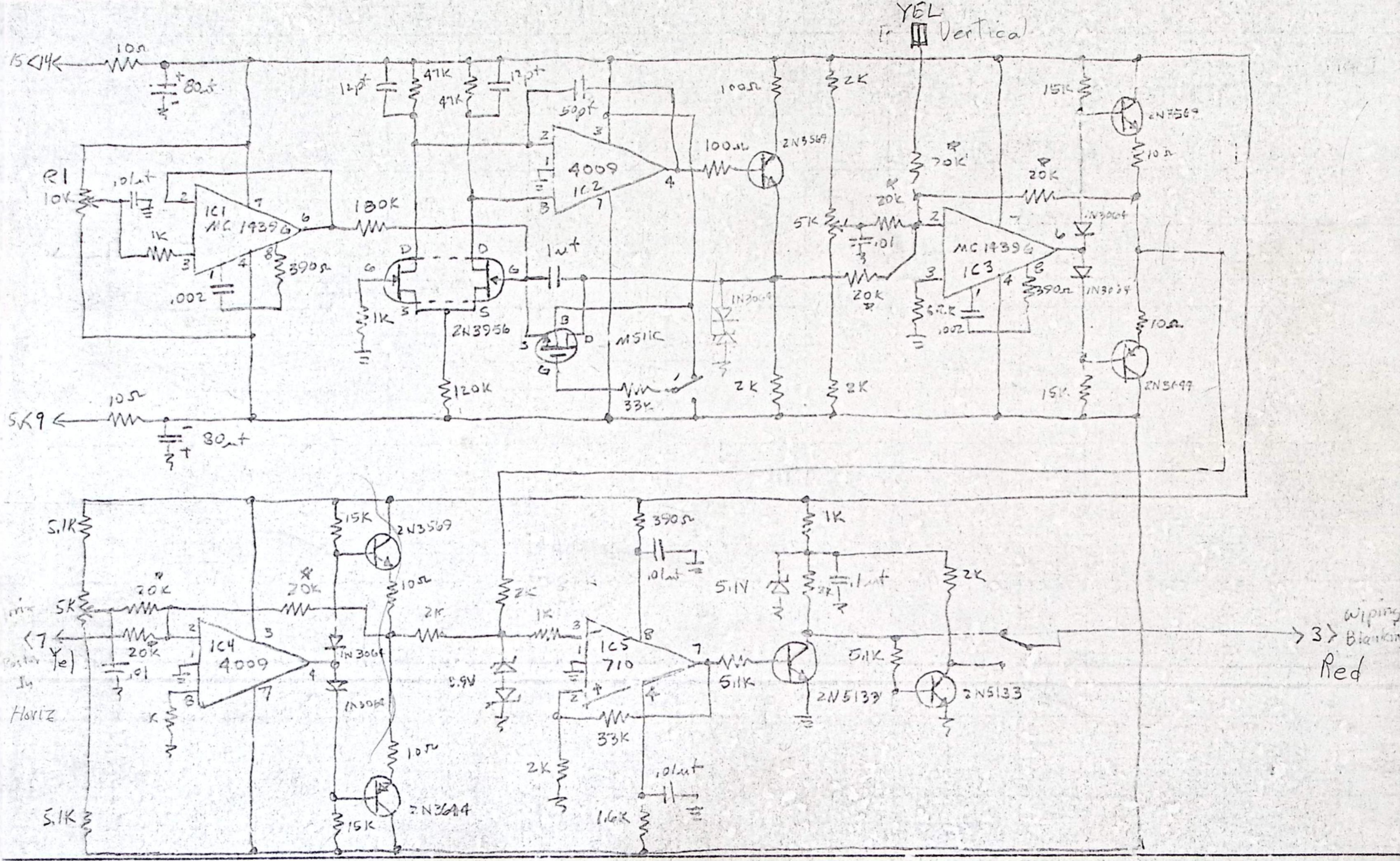
2400 HZ

XSM 119

SINE WAVE FILTER

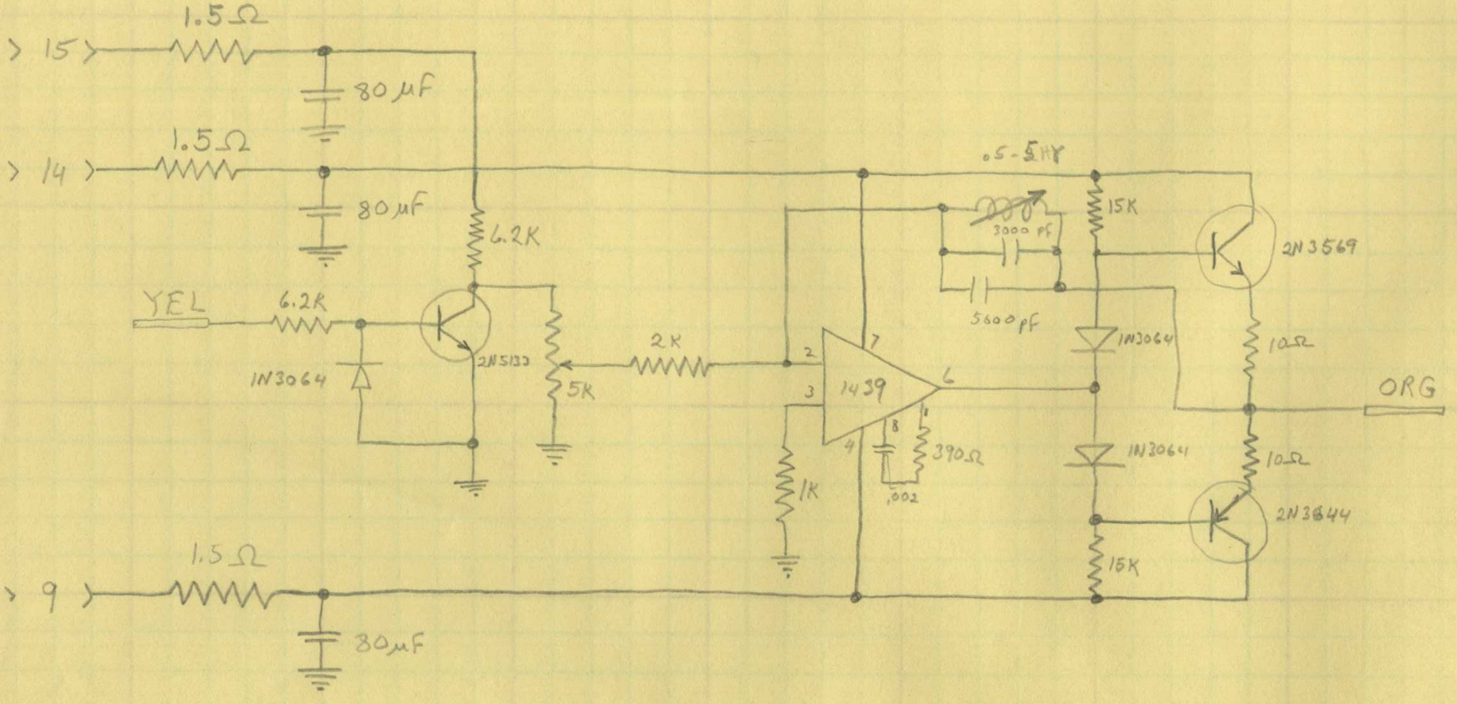
11-28-69





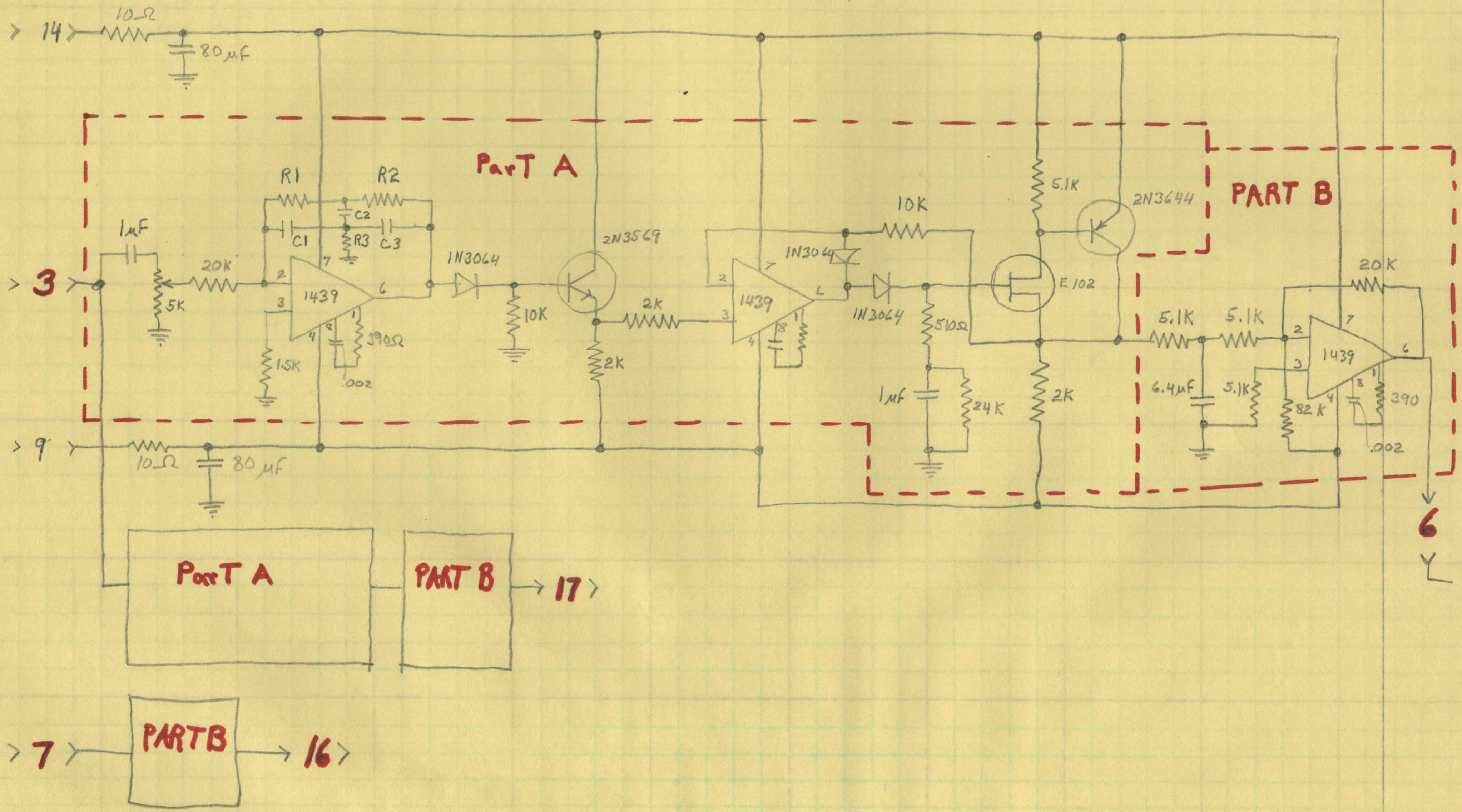
Wiping Blanking

2/6/69



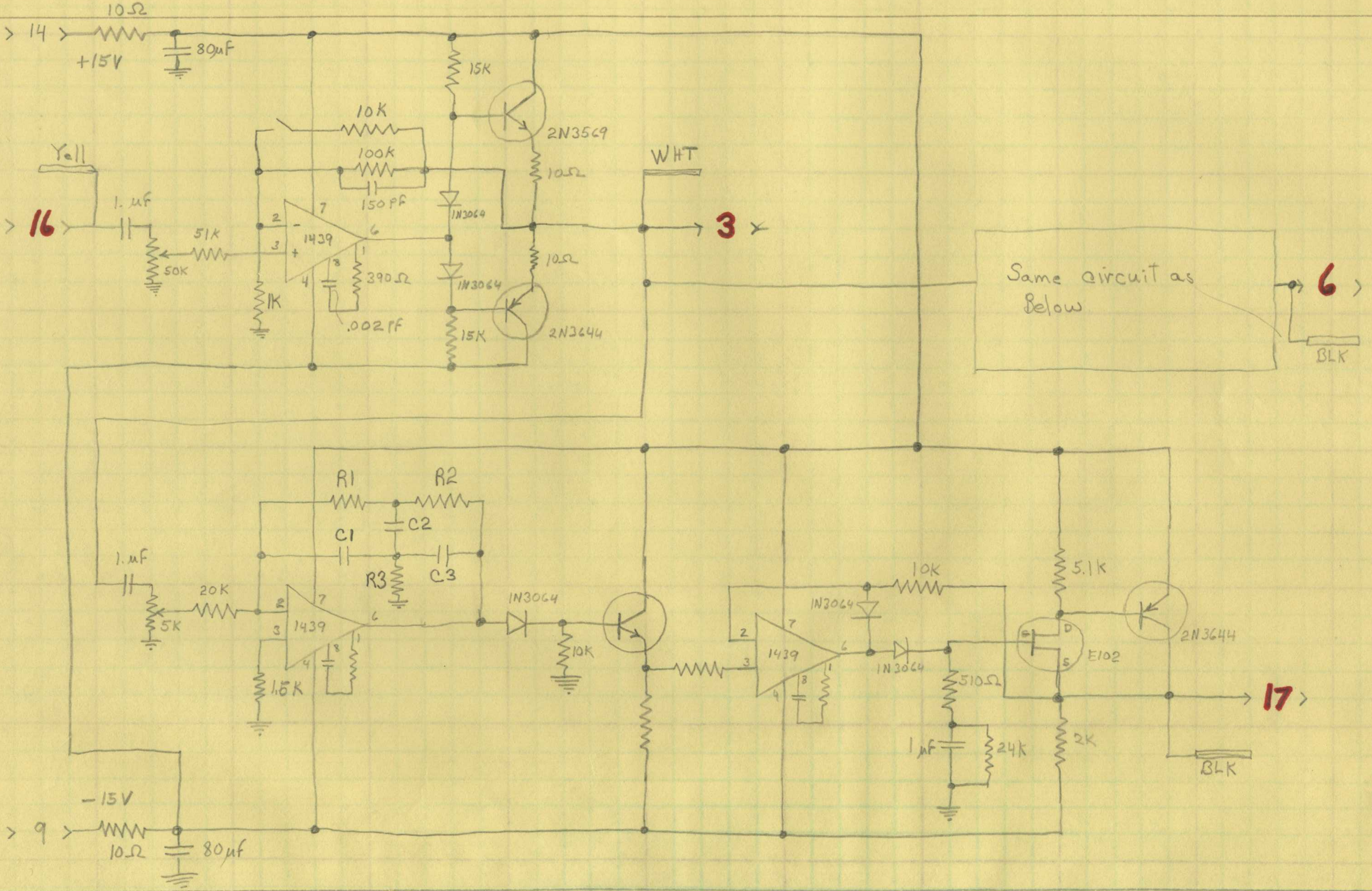
1440 Hz

SINE WAVE FILTER 11-28-69



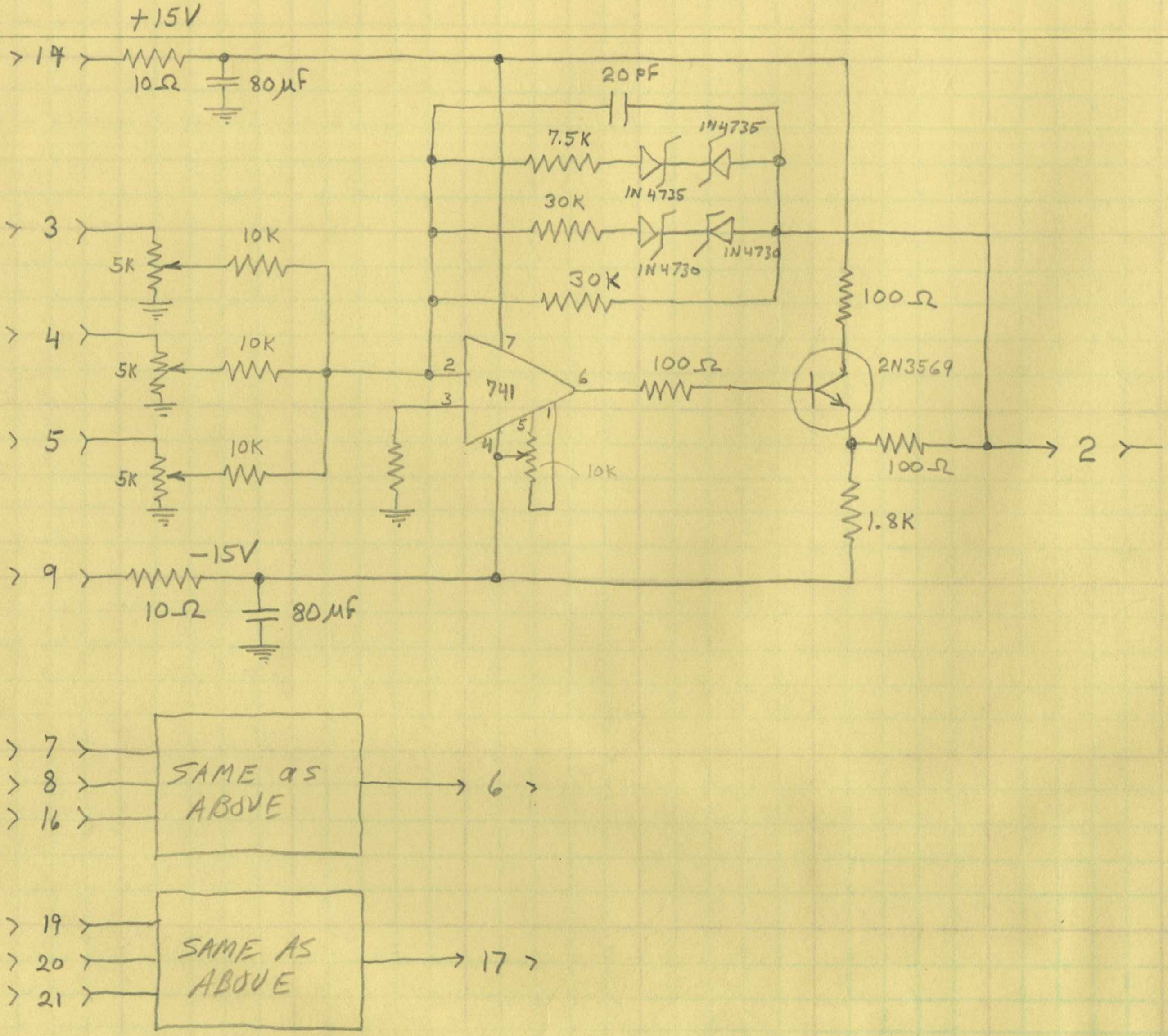
J1 & J3

FILTER CIRCUIT MOUTH



J2

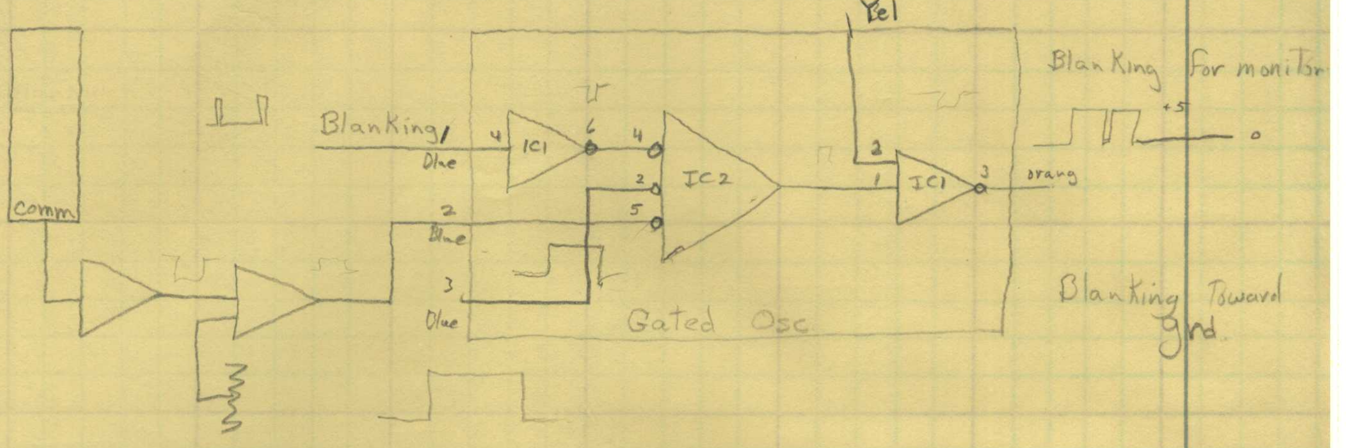
MOUTH SPECTRUM ANALYZER AND PREAMP



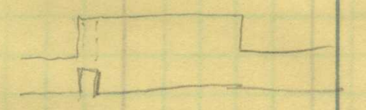
J5

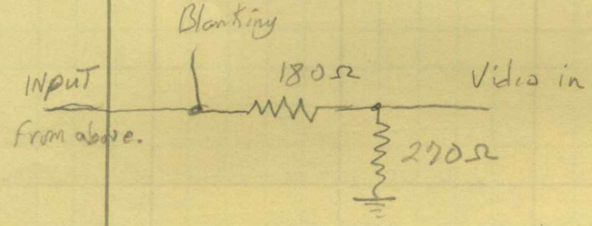
NON-LINEAR AMPLIFIER
(MOUTH CIRCUIT)

BLANKING FOR FILMING MONITOR



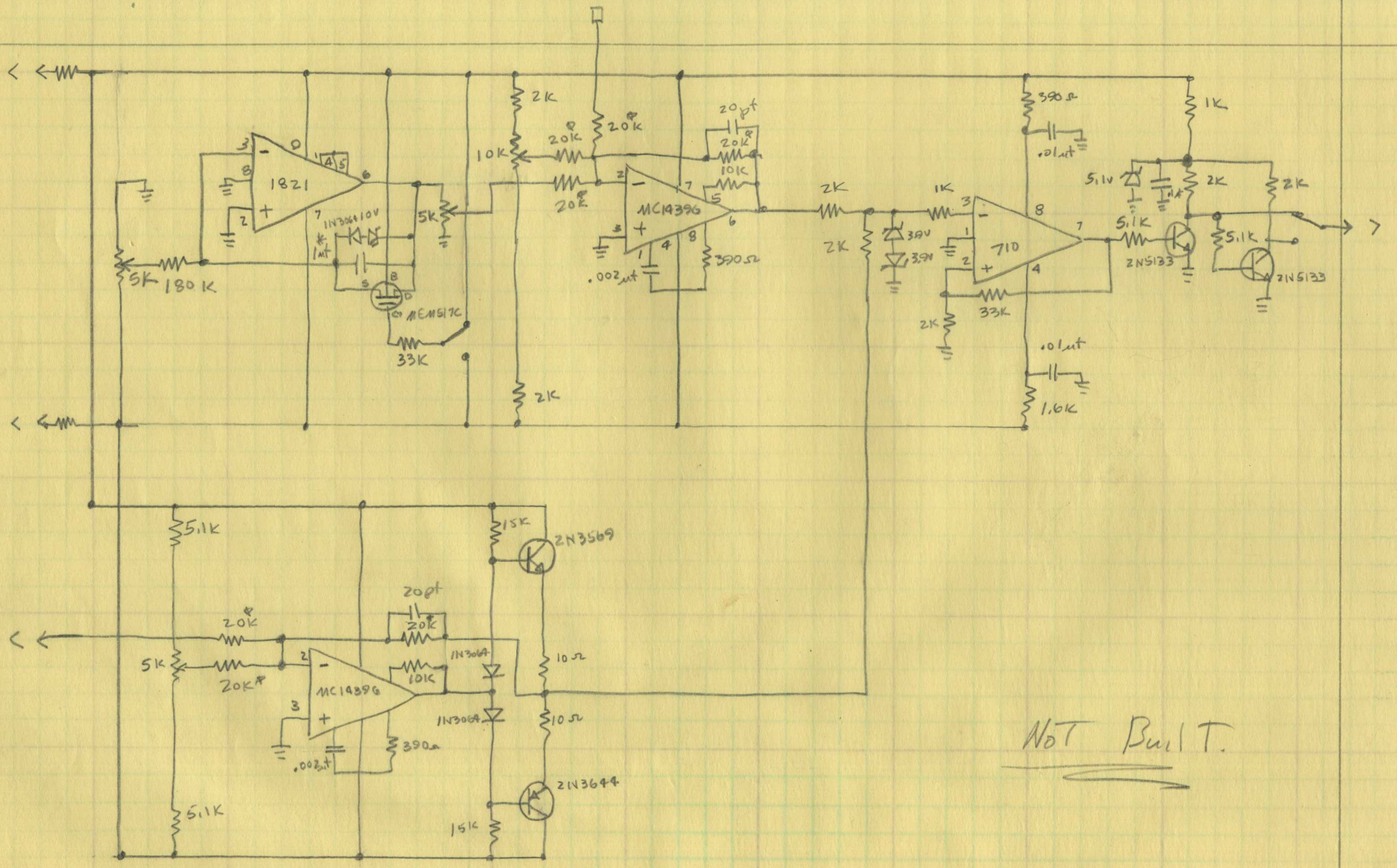
Need +Voltage For Video input.





Size controls on intensity have DC inputs also scanimate intesity

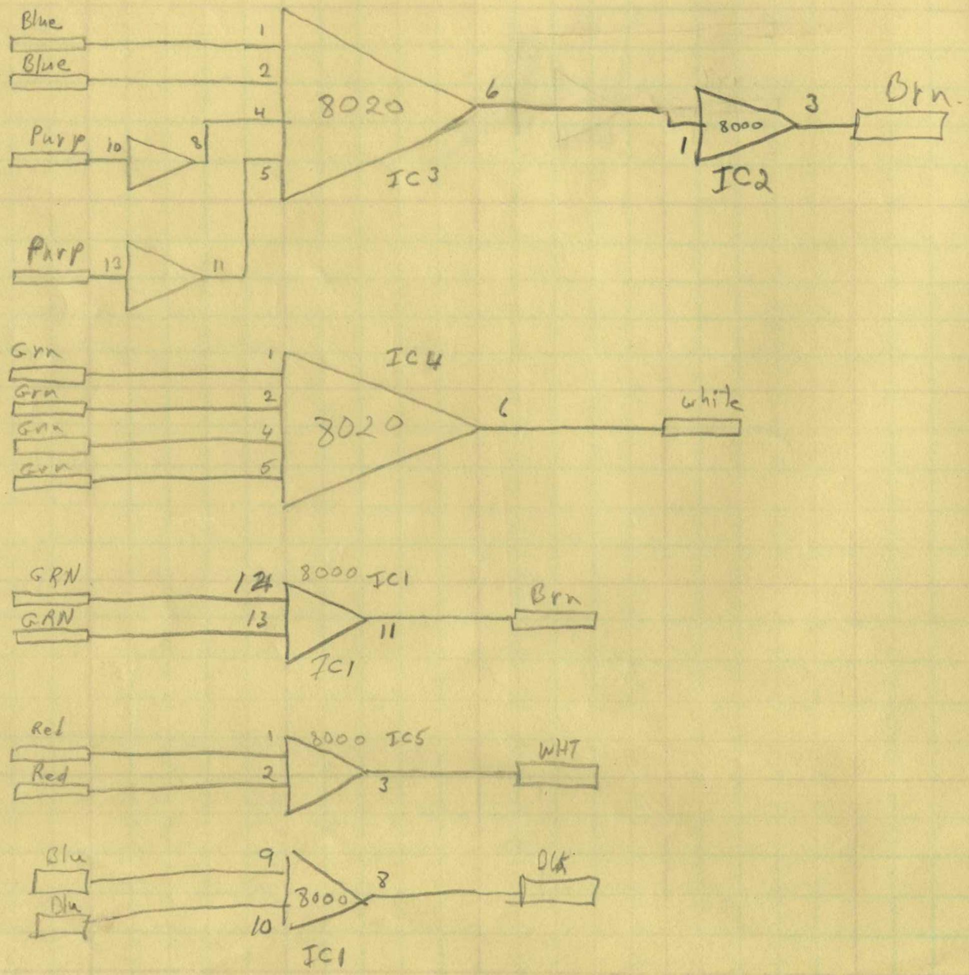
Z input is attenuated a quitsabit.



NoT BuilT.

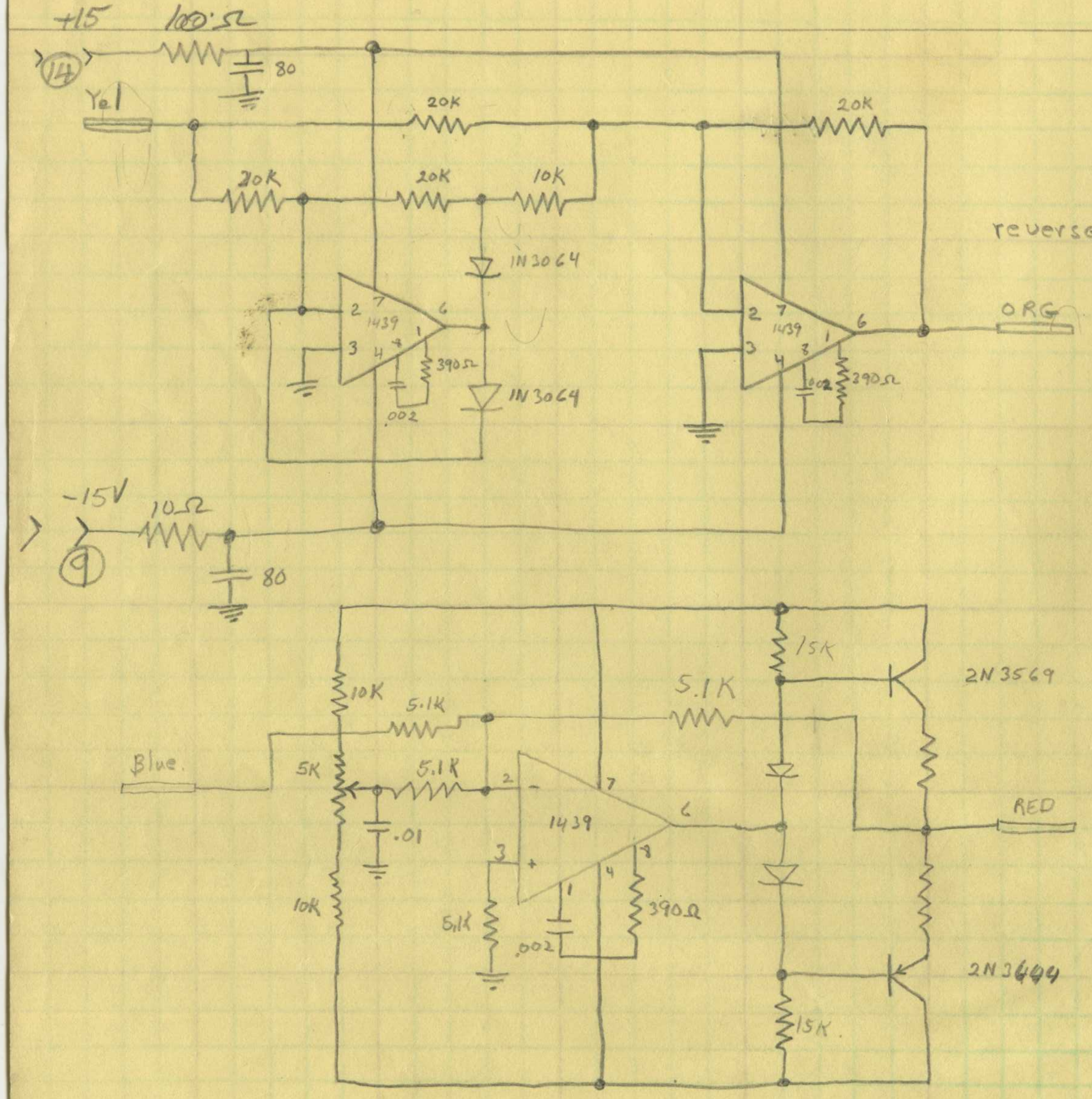
Wiping Blanking

2/12/69



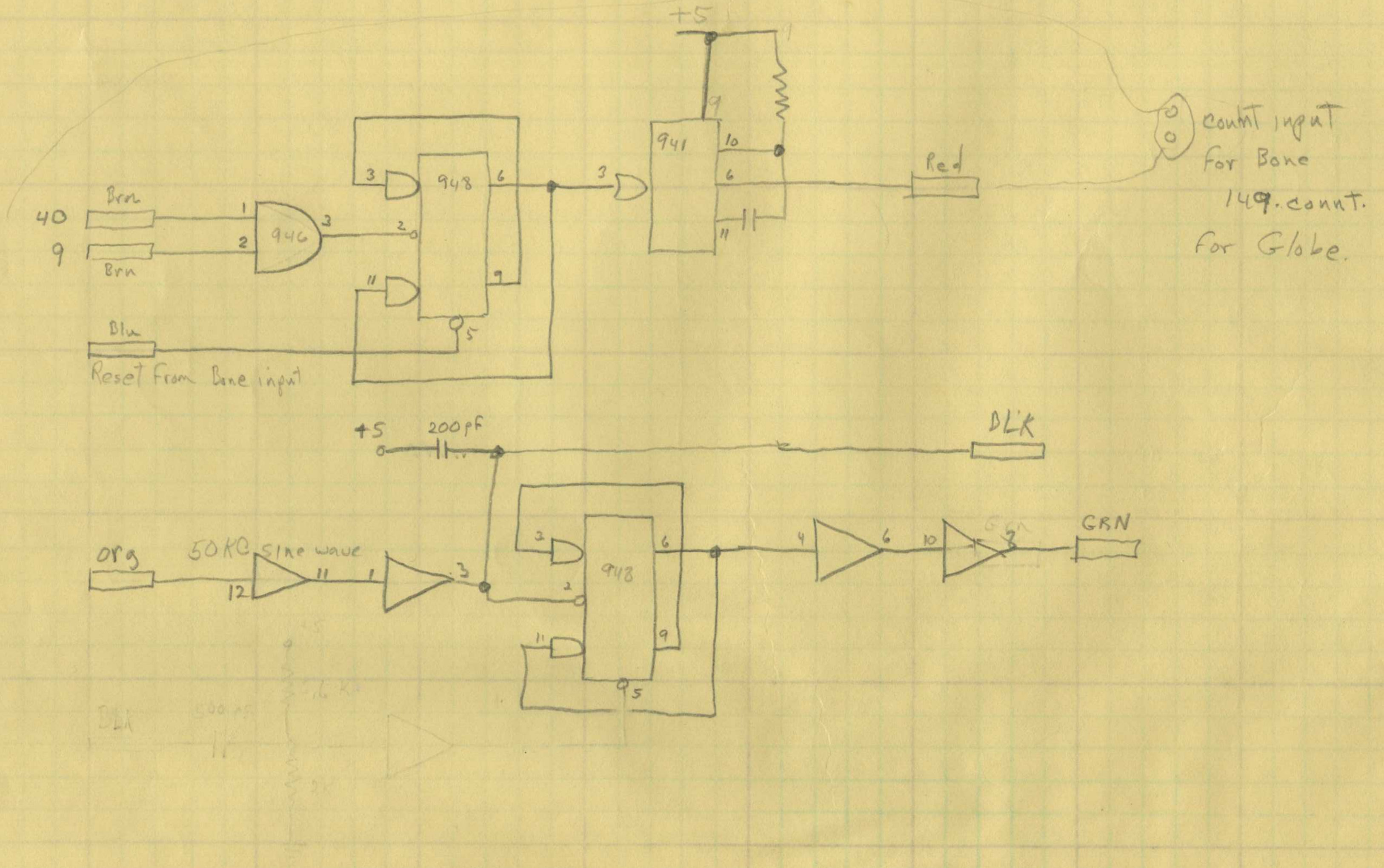
Has Been Modified

INTENSITY BOARD 11-7-69



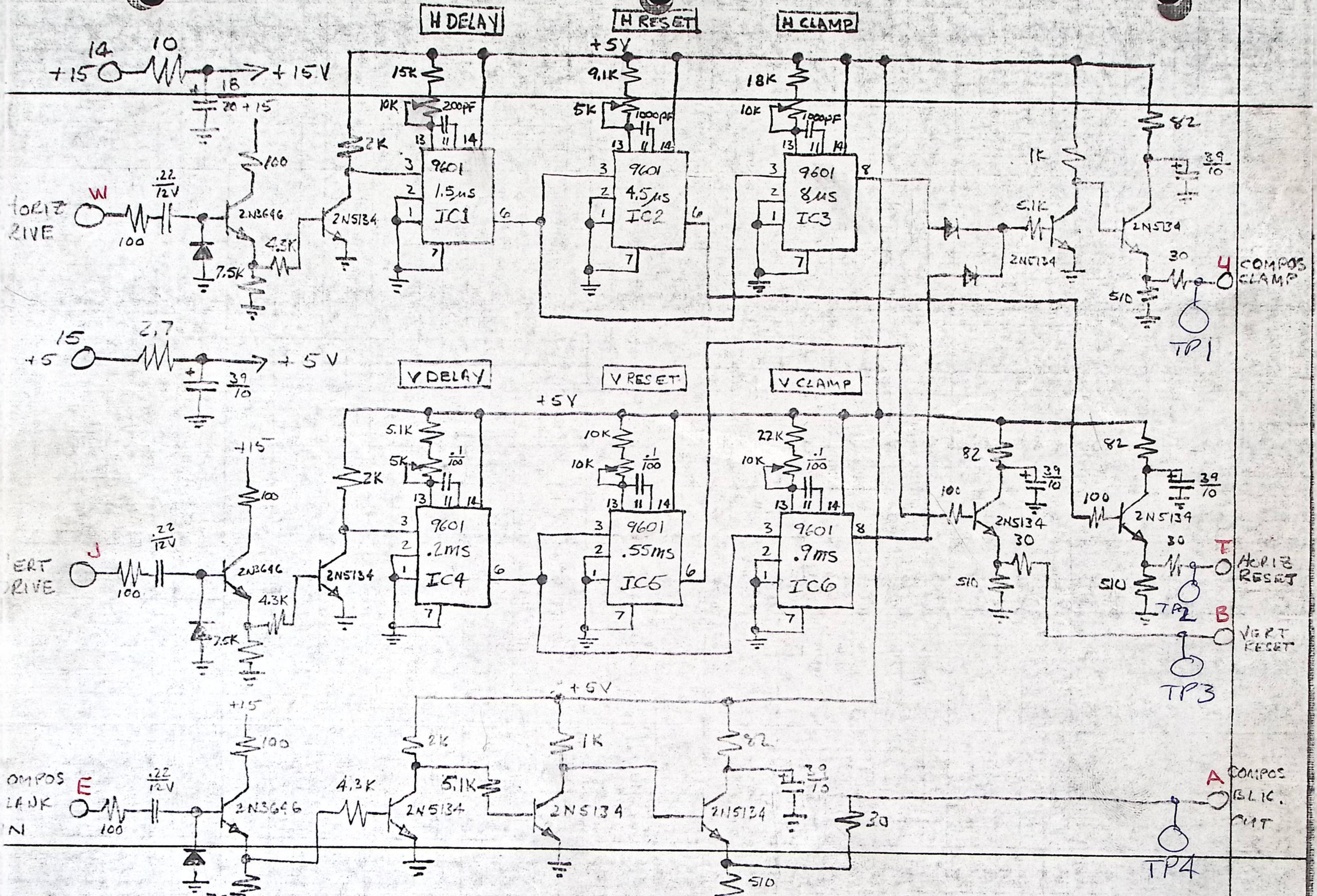
reverse diodes to get negative signal

Full Wave Recterfier Board.



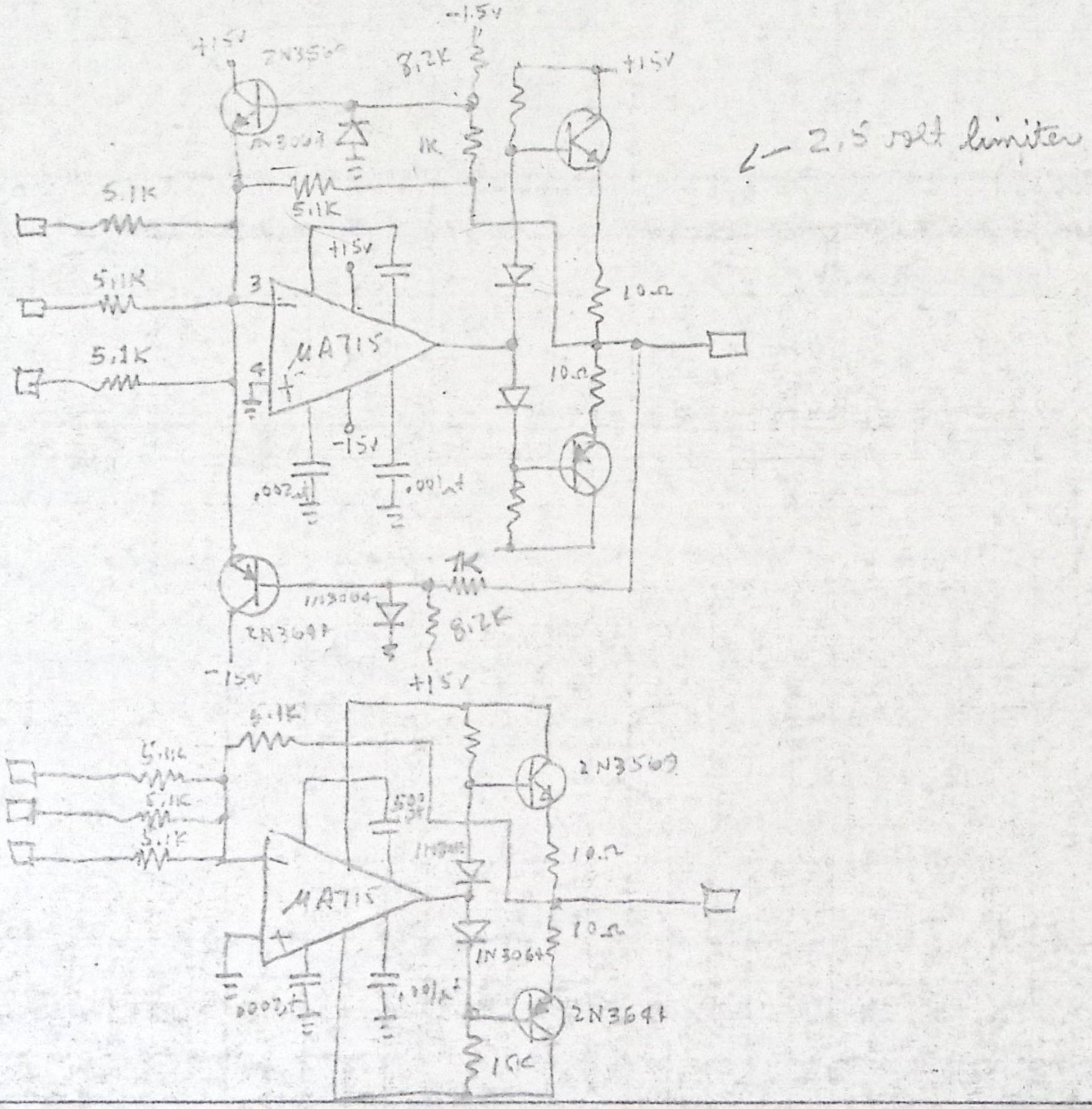
OLD Master control card.

10-15-69

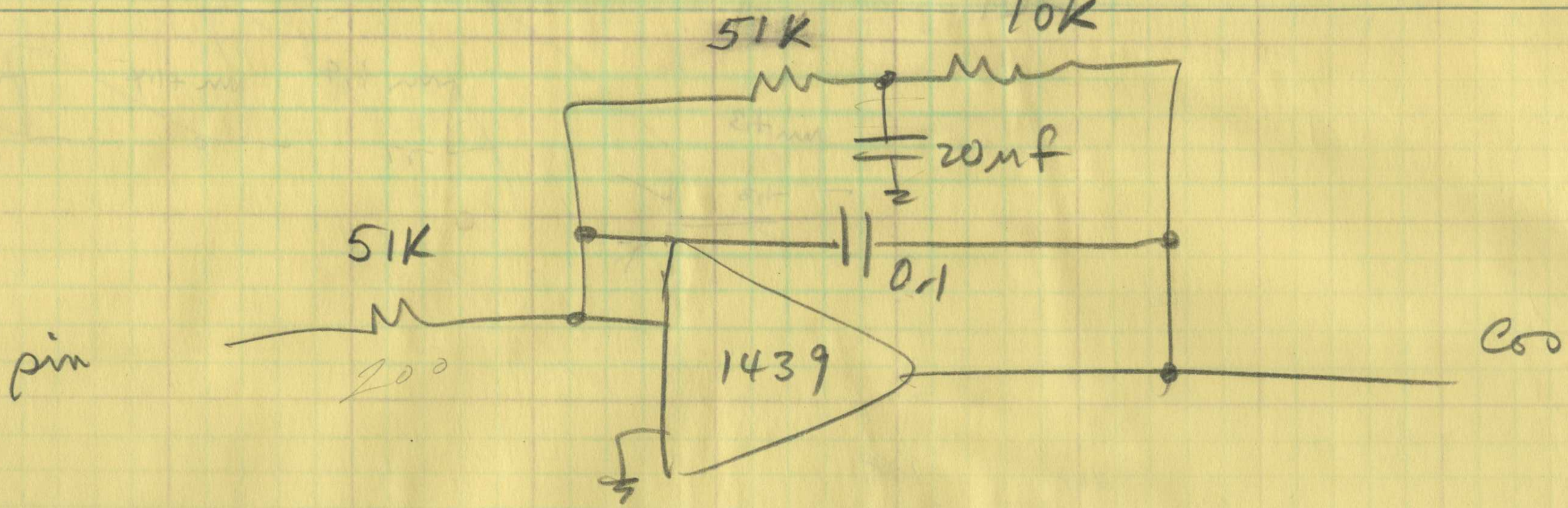


SYNC TIMING CVS-102

(COLOR VIDEO SYSTEM



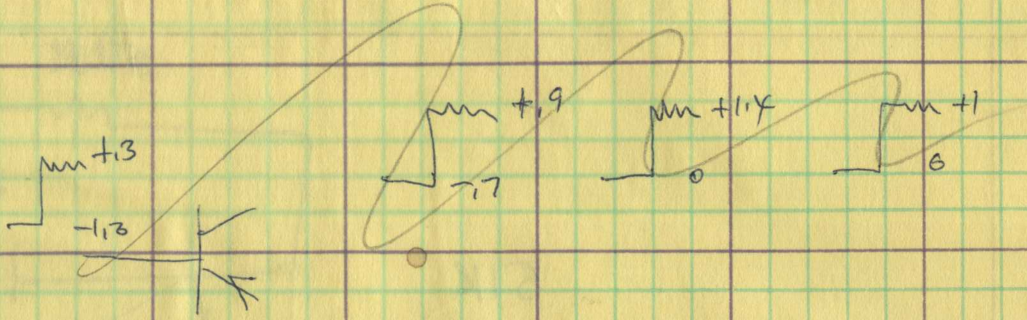
circiut used for changing ○ to □ and 3 amp board.

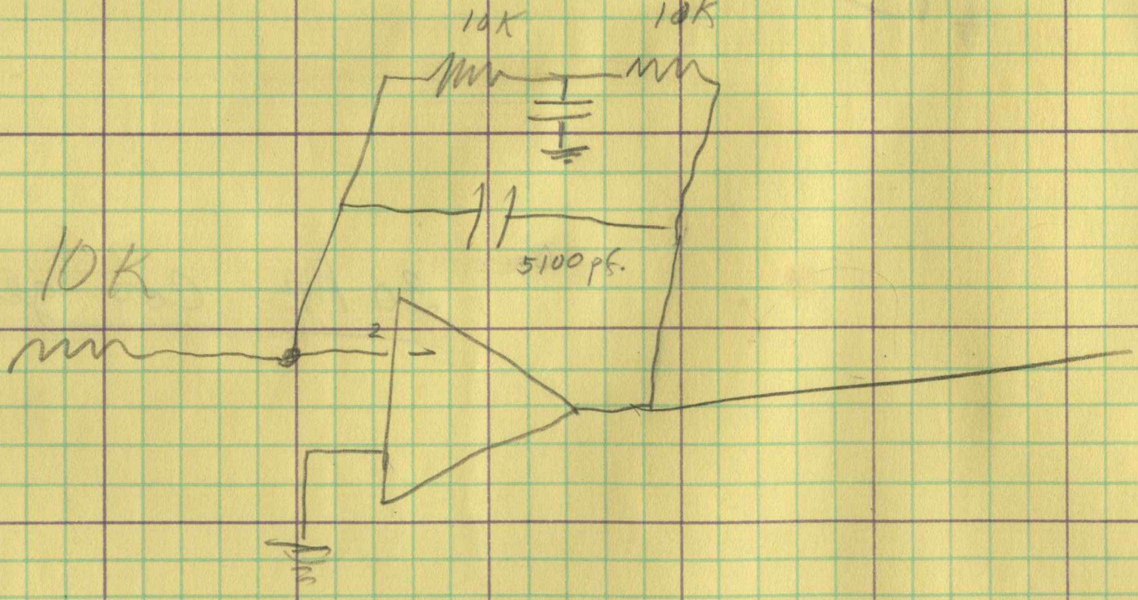


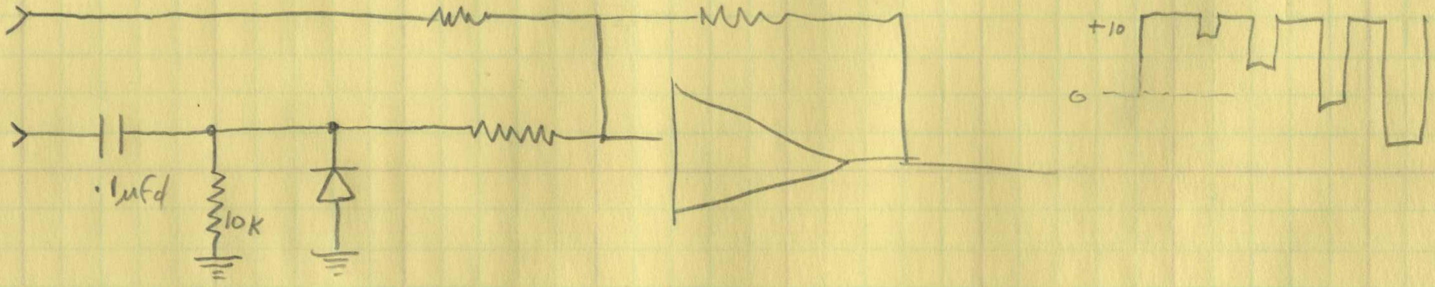
10K

30 Hz Cos gen.

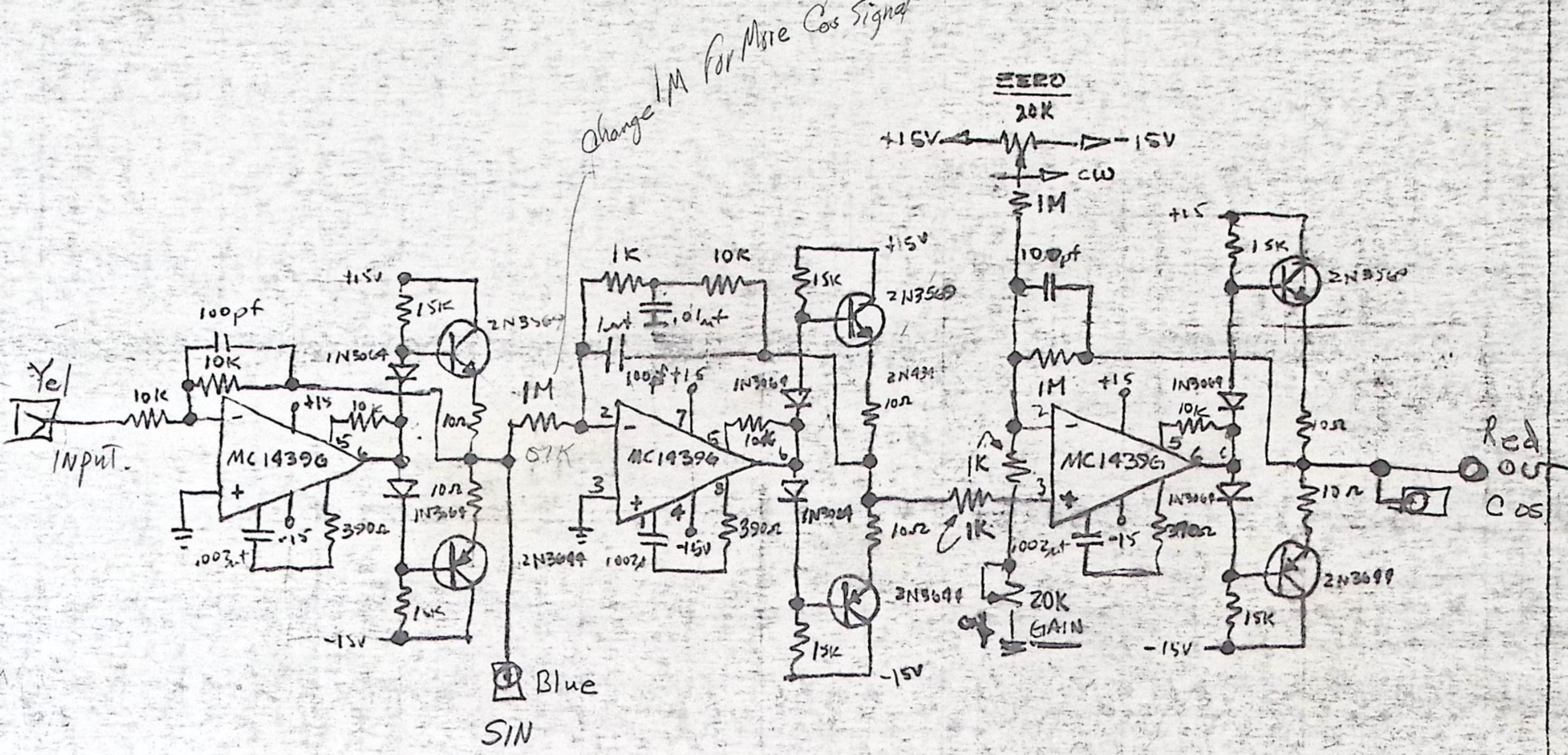
SIN Cos Board. IC 2


+.3
-1.8
+.9
-.7
+1.4
0
+1
0


10K
10K
5100 pf.
10K
2
-



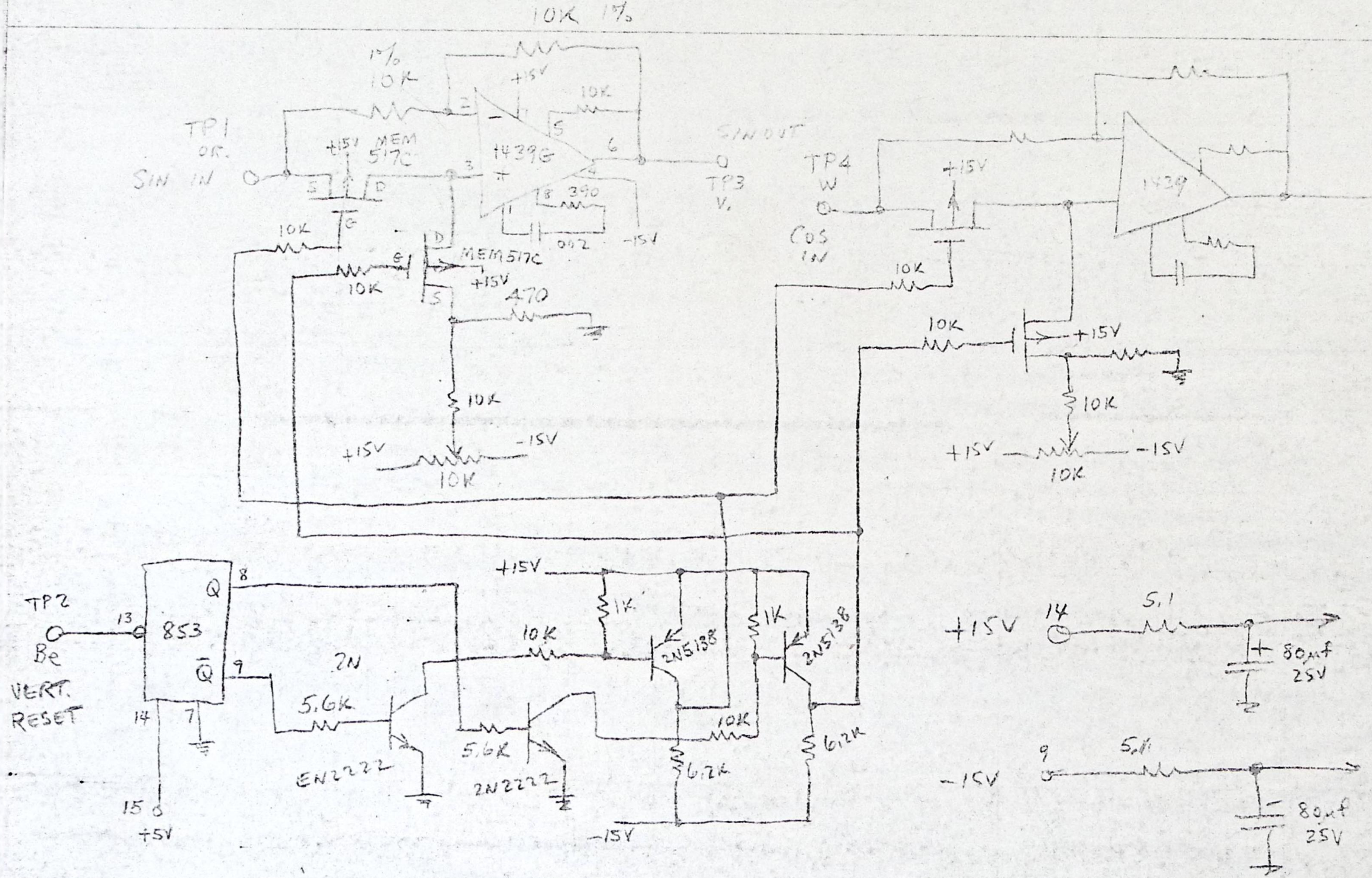
Used on the 3 amp Board for Holding to Ten volts



change 1M For More Cos Signal

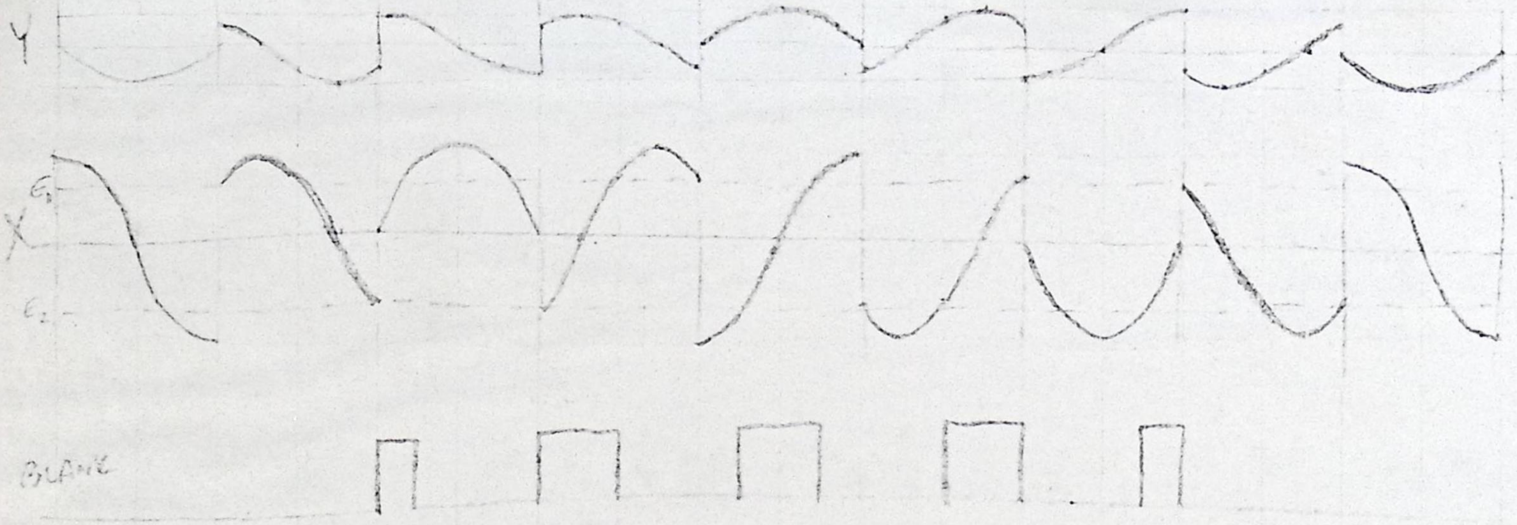
$$\frac{20V}{200mV} = 0.1 \times 10^{3}$$
$$= 100$$

Sine Cos Board.

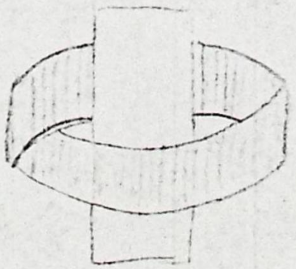


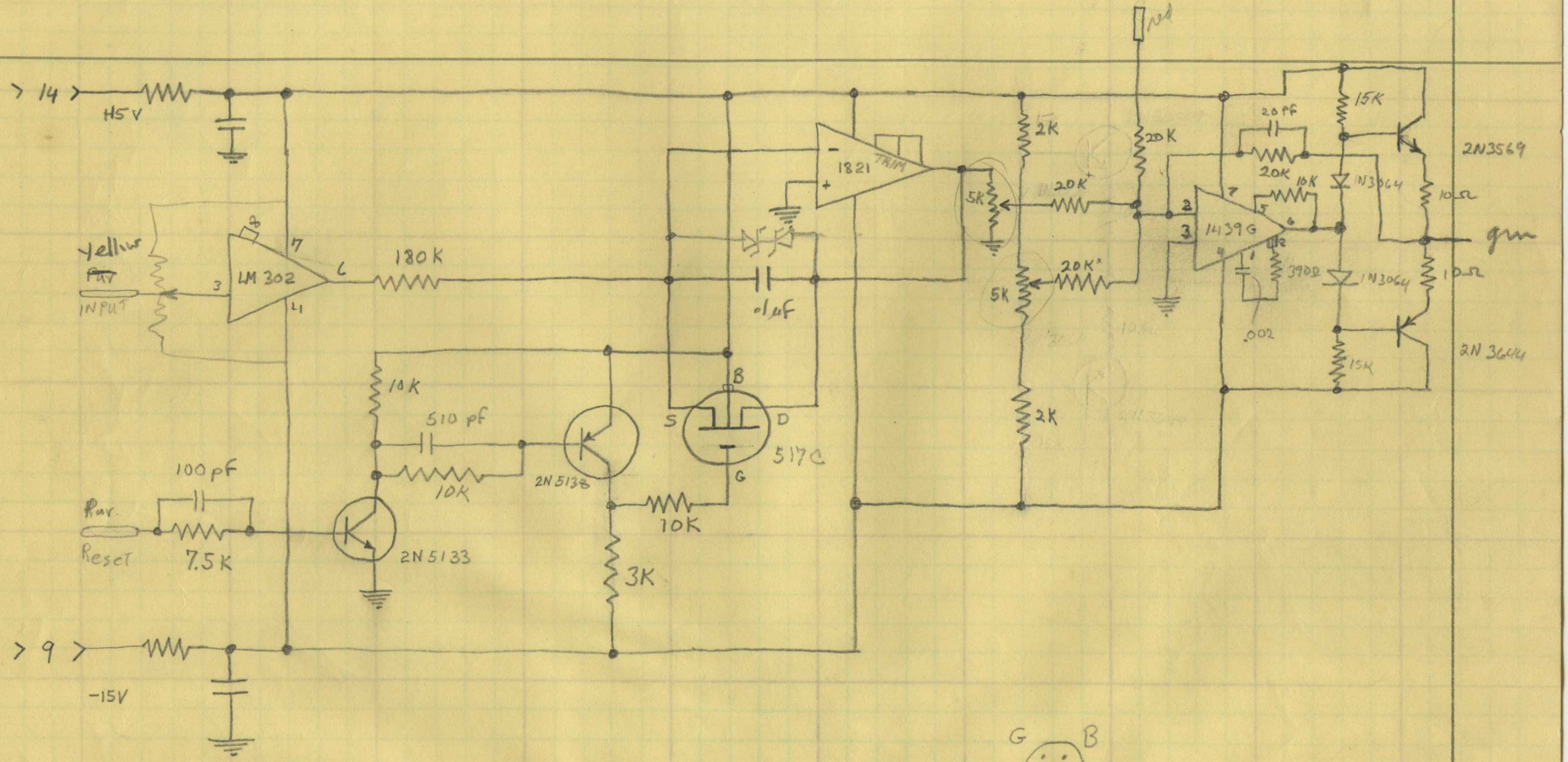
ALTERNATE FRAME INVERTERS

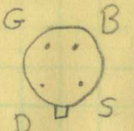
ALTERNATE FRAME INVERTERS



when
$Y > 0$
and $E_1 > X > E_2$

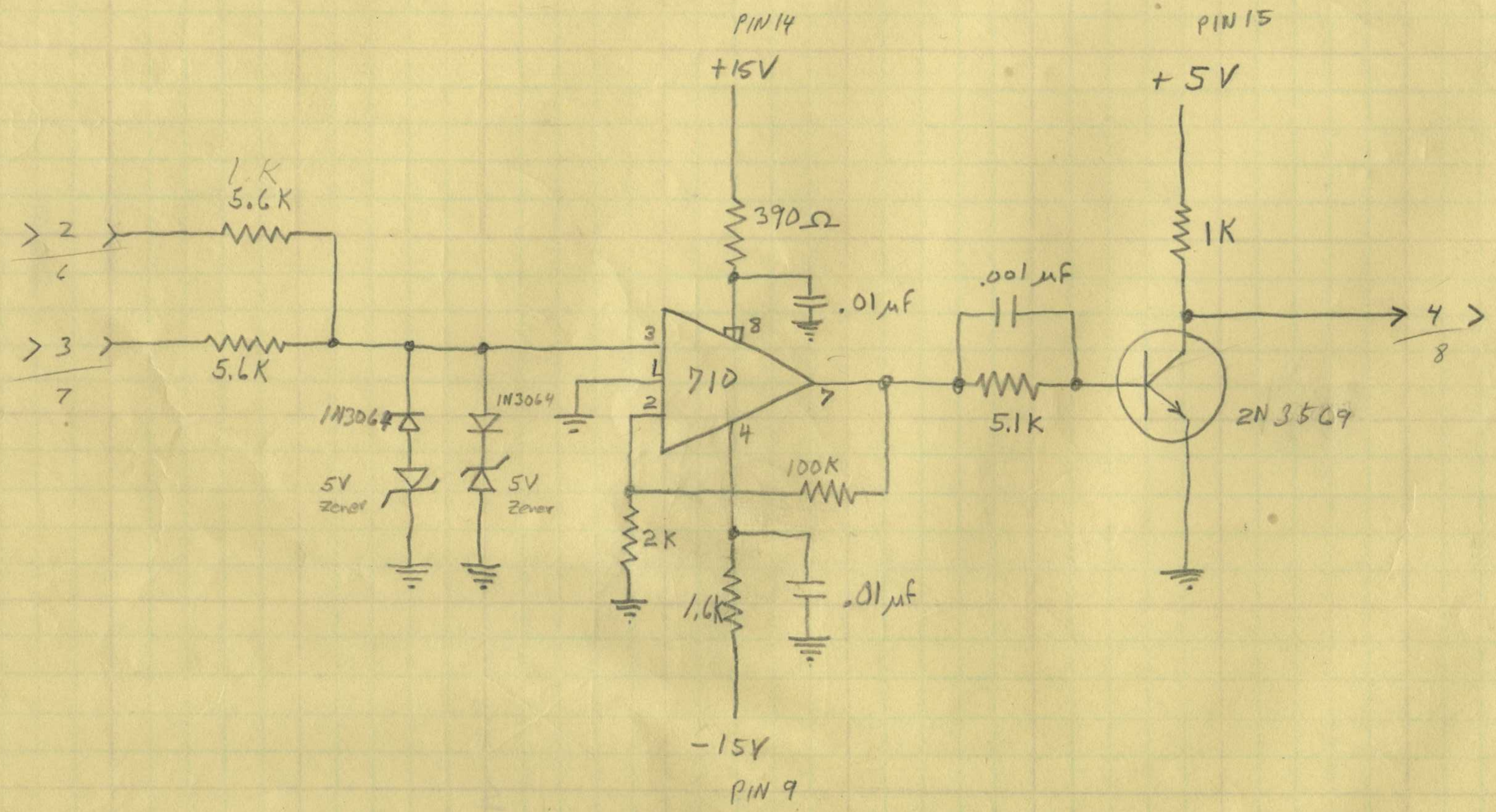






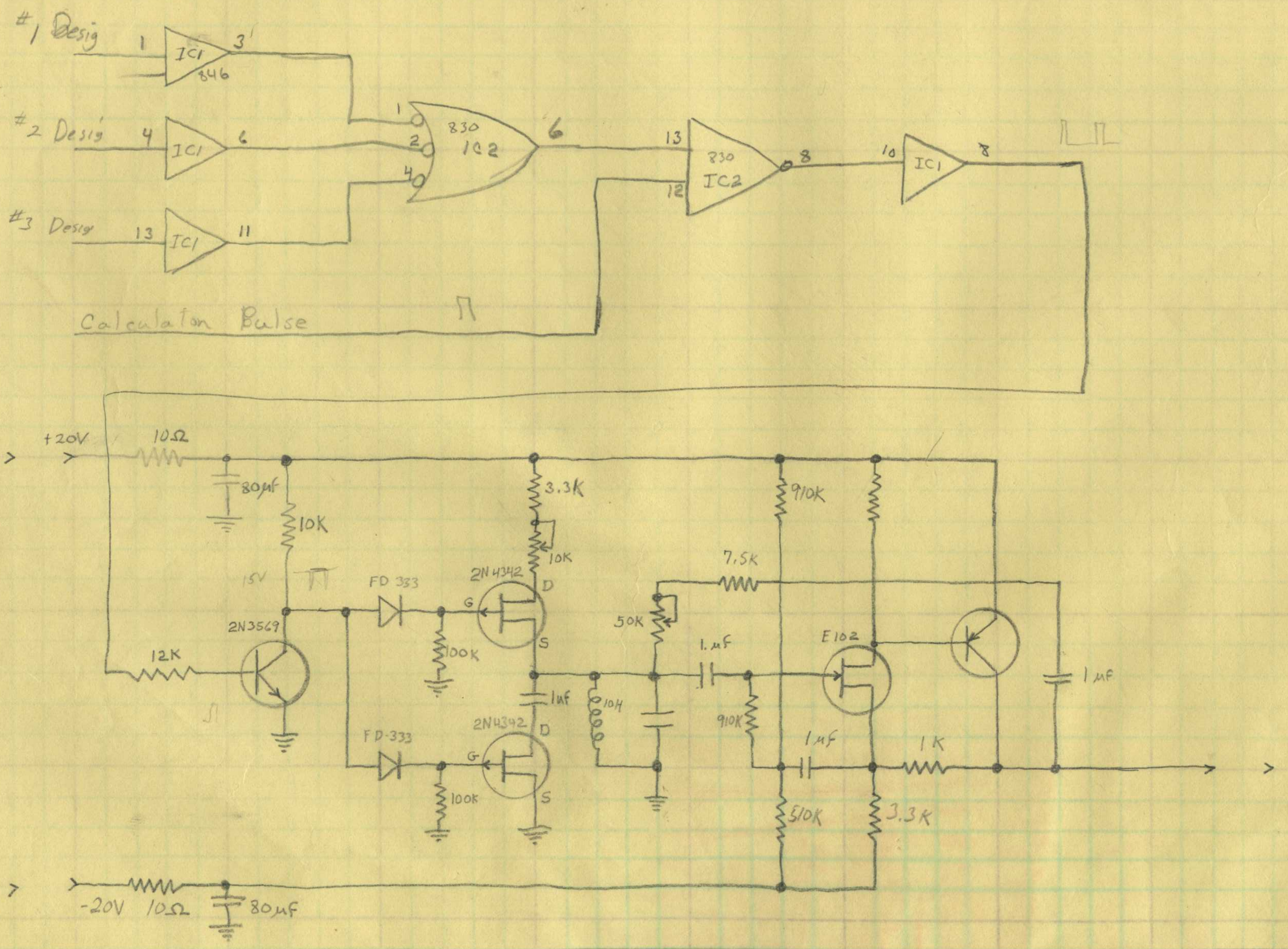
517C
Bottom.

RAMP 2 on Board 11-11-69



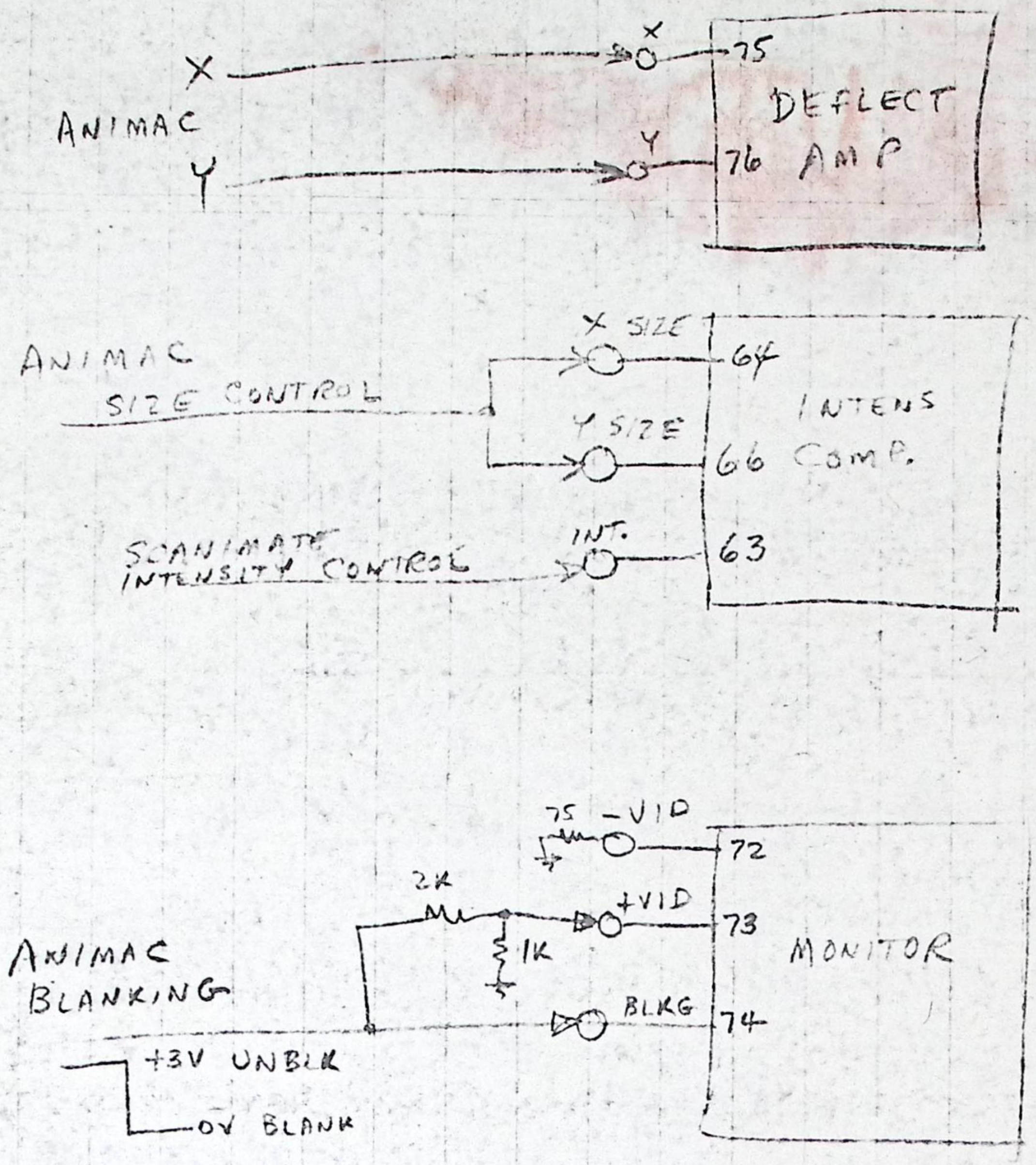
16	19
17	20
18	21

Comparator card 10-10-69



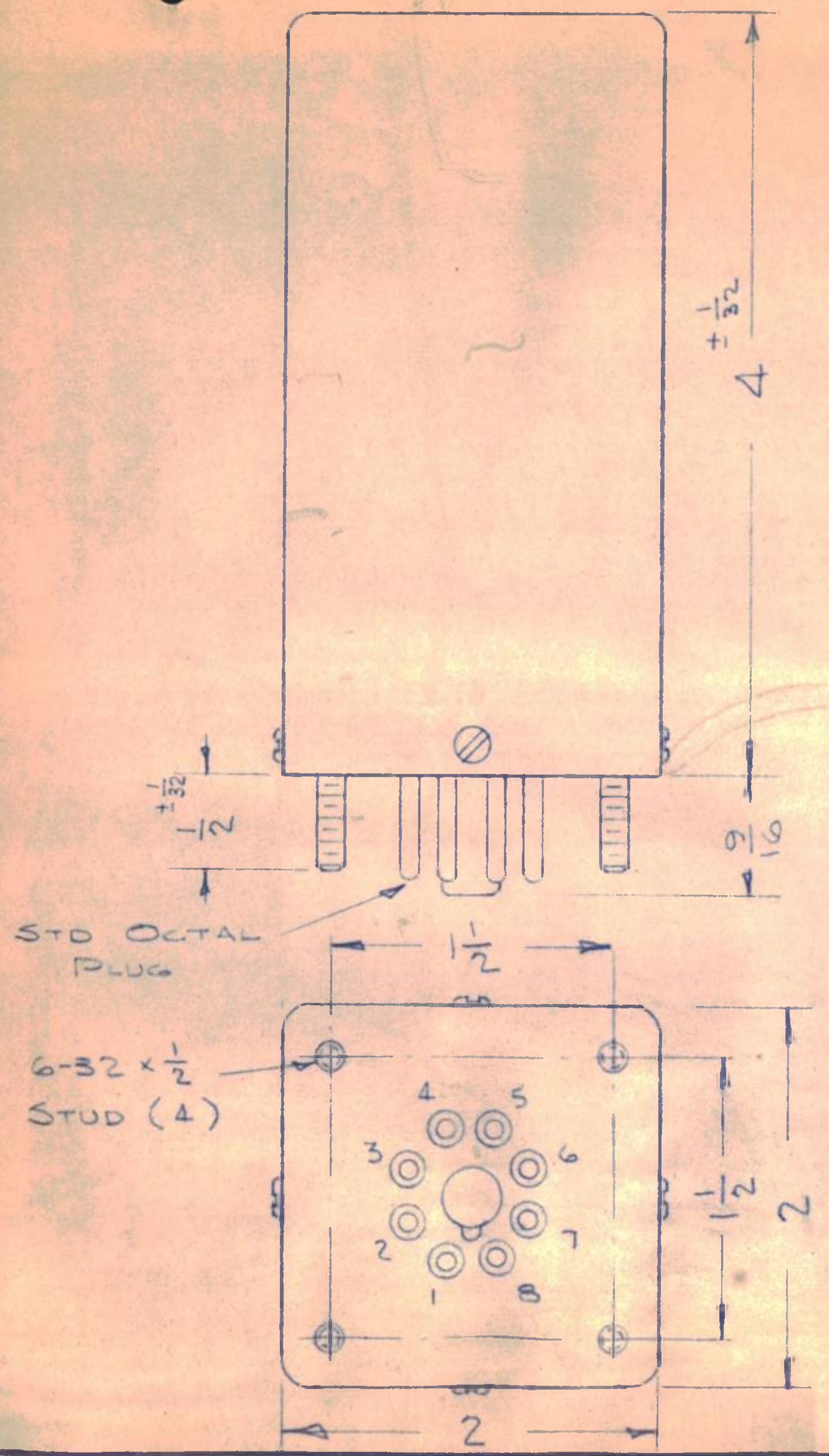
Gated osc

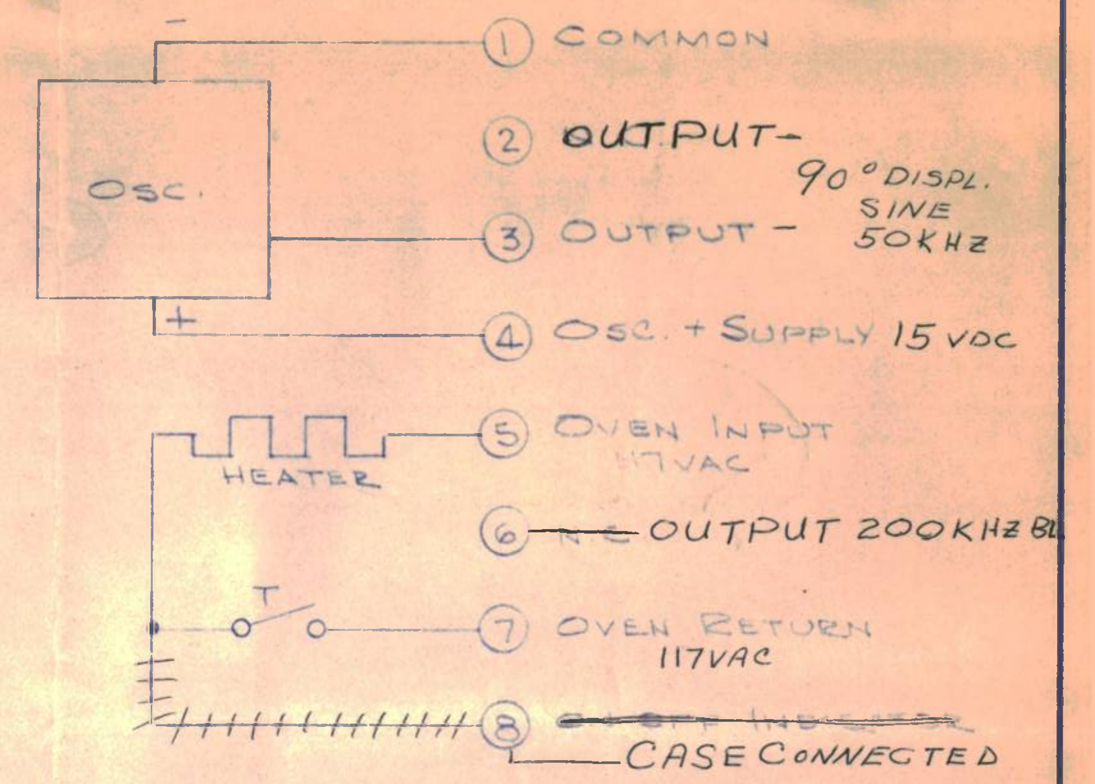
8-18-69.



ANIMAC - MONITOR CONNECTIONS

32A039





NOTES:

1. DIM. TOL. ±1/64 UNLESS OTHERWISE SPECIFIED.
2. REMOVE OVEN COVER FOR ACCESS TO FREQUENCY TRIM CONTROL.

695AP

FORK STANDARDS, INC.

WEST CHICAGO, ILLINOIS

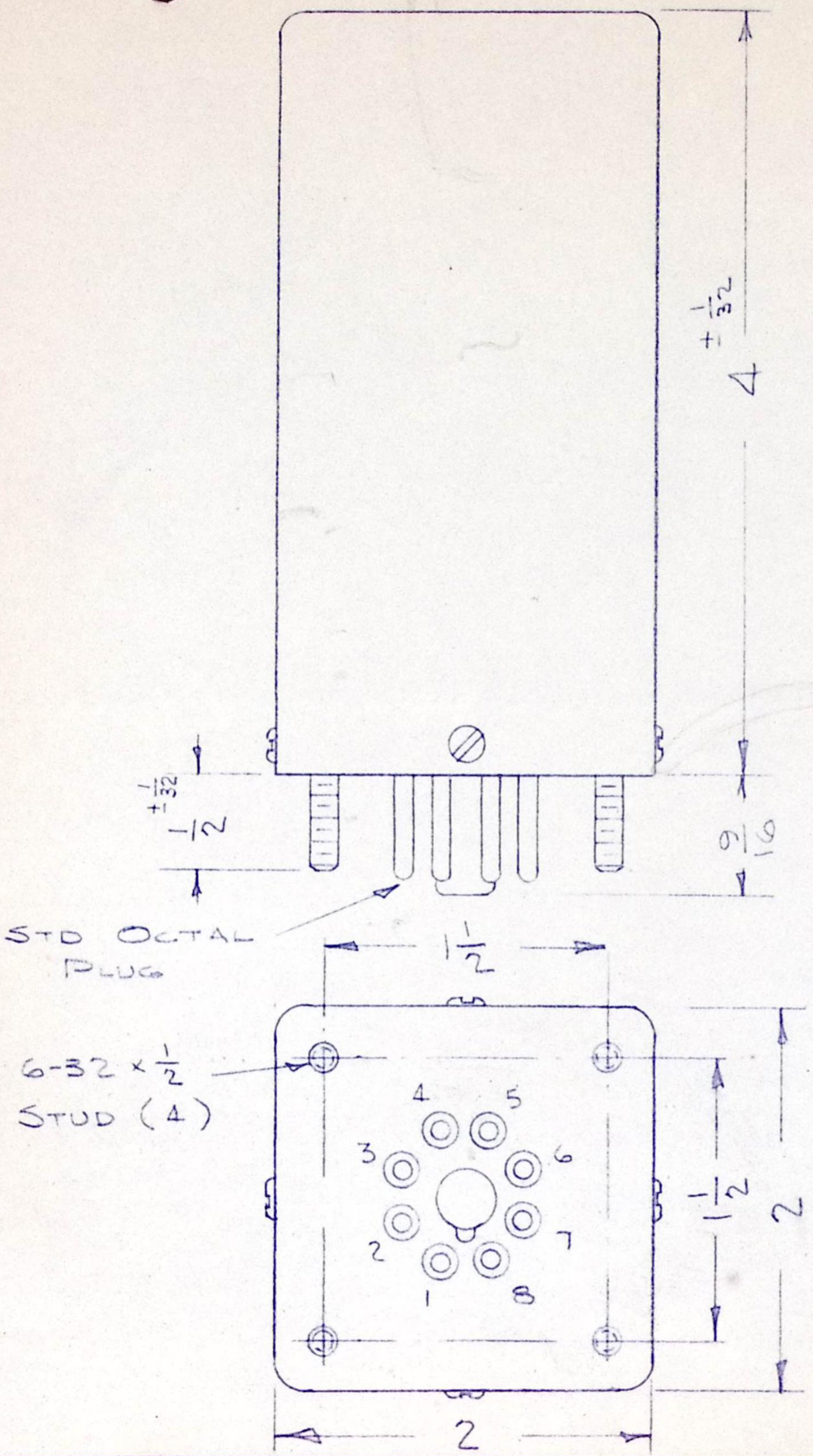
SCALE: FULL	**APPROVED BY:**	**DRAWN BY** RED
DATE: 8-20-68		**REVISED**

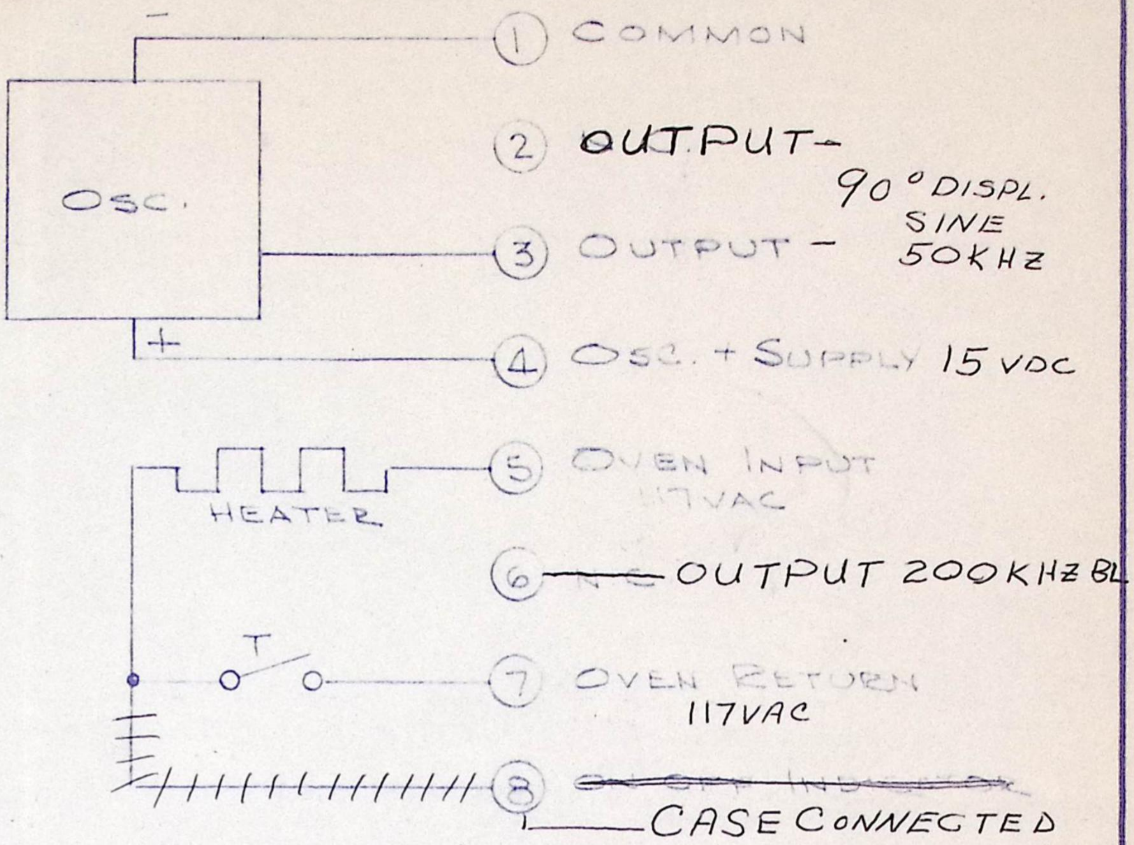
OUTLINE & TERM. CONNECTIONS

DRAWING NUMBER 32A039

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT

32A039





NOTES:

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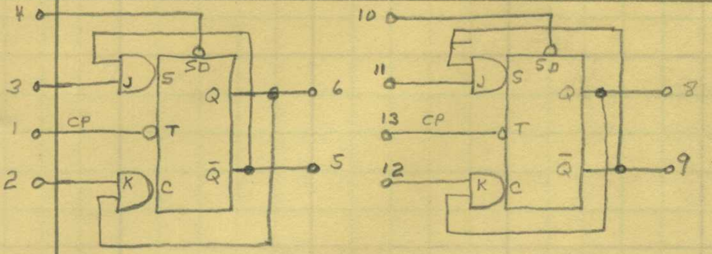
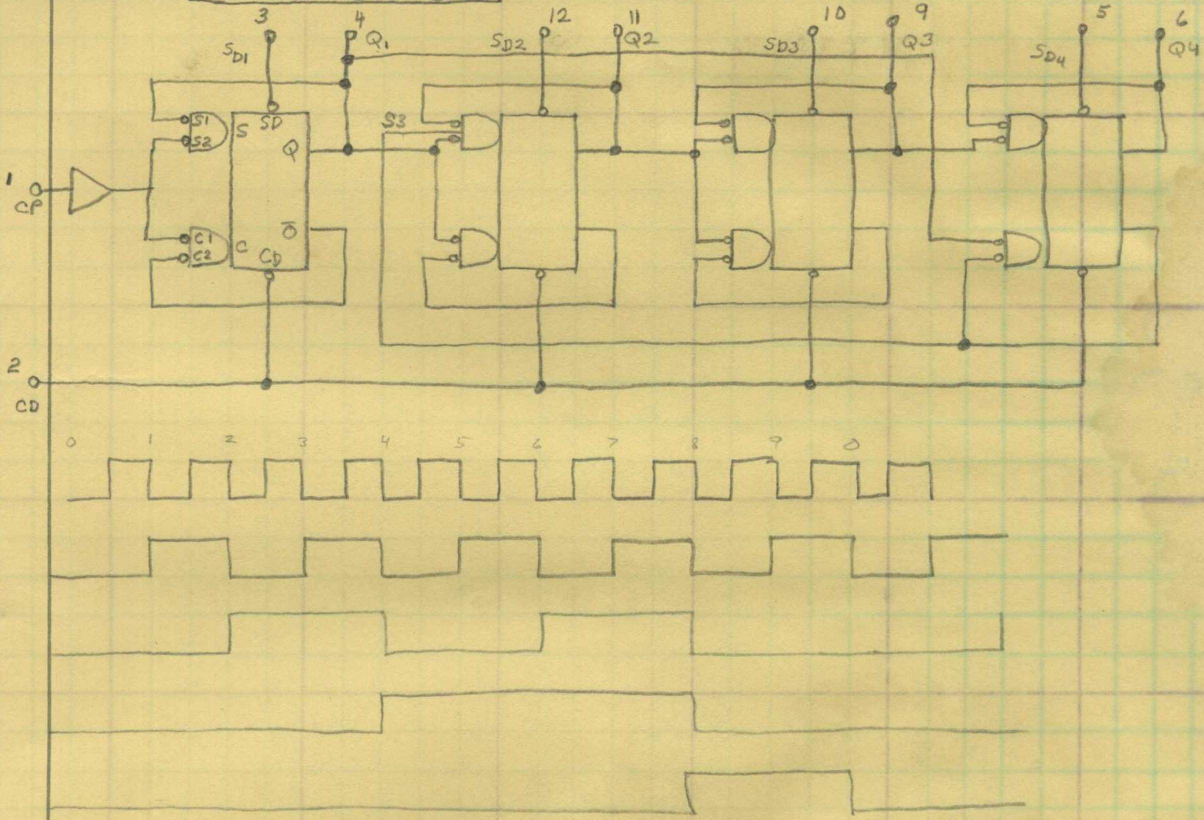
IC's



MC 853



MC 838

HYBRID COMPONENTS, INC.

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